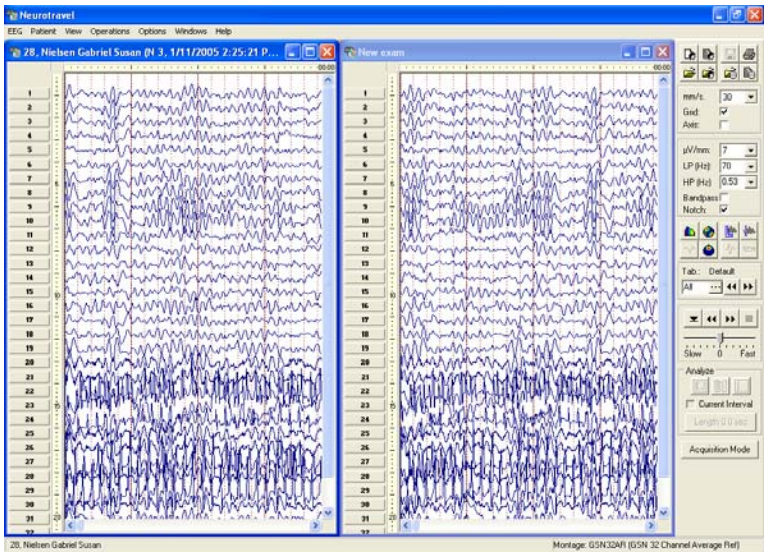
Neurotravel Win

Technical Manual



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Neurotravel Win

Technical Manual

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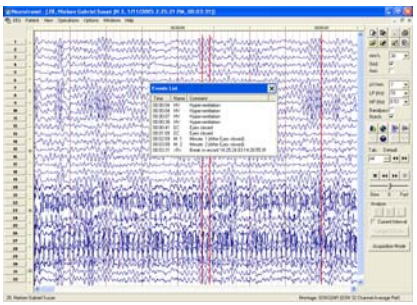
PREFACE

Neurotravel Win from Electrical Geodesics, Inc. (EGI) is a complete software package for working with electroencephalography (EEG) data in clinical applications. With Neurotravel Win, you can:



- acquire EEG data, in conjunction with EGI's Geodesic Sensor Net and a Neurotravel amplifier
- view and navigate EEG data in multiple windows simultaneously, in real time or during review
- record monopolar EEG signals, while performing trace remontage and refiltering, in real time or during review
- manage, catalog, and research patient data and exams

This manual, the ***Neurotravel Win Technical Manual***, is intended primarily for clinicians who are involved in the acquisition, recording, archiving, and management of EEG data.

The *Neurotravel Win Technical Manual* assumes you are familiar with the PC, the platform on which Neurotravel Win is based.

Neurotravel Win Overview

Neurotravel Win is a complete, PC-based EEG acquisition, review, archiving, and database-management program designed for clinical environments such as hospitals and physician's offices.

During data acquisition, Neurotravel Win enables you to monitor signal quality by checking sensitivity, filtering, and acquisition speed in real time. You can visualize as many as 32 EEG signals, and populate them with time markers, stimulus markers, and event markers. Video-scrolling speeds are 7.5, 15, 30, and 60 millimeters per second.

During data review, you can remontage and refilter signals, search by events, and zoom in on details of interest. Neurotravel Win also enables you to define montages, frequency bands, photostimulation procedures, and event tables to use online. Its integrated database allows you to generate reports of patients or exams efficiently (and to archive such data), with quick catalog and search functions.

See Figure 2-1 on page 53 for an illustration of the entire Neurotravel process.

About This Manual

This manual is supplied as a PDF file and in printed form. The hard-copy version has been printed from the PDF so the content of both will match. The hard-copy manual contains grayscale images; the PDF contains color and grayscale images.

The manual features a table of contents, list of figures, list of tables, and index, which are all hyperlinked in the PDF to the topics they reference in the publication.

The PDF file is also available by choosing **Help > Index** from within Neurotravel Win.

Note: Acrobat Reader is needed to open the PDF versions.

Manual Organization

The discussion in the manual falls into five major categories:

- *Installation and interface*:
  - Chapter 1, "Installing Neurotravel Win"
  - Chapter 2, "Process Overview"
  - Chapter 3, "Neurotravel Win Interface Basics"
- *General operations*:
  - Chapter 4, "Acquisition and Recording"
  - Chapter 5, "Review and Processing"
  - Chapter 6, "Automatic Calculations"
- *Specific tools and menus*:
  - Chapter 7, "Function Tools"
  - Chapter 8, "Patient Menu"
  - Chapter 9, "Options Menu"
- *Optional video feature*:
  - Chapter 10, "VideoEEG Kit Option"
- *Disk management*:
  - Chapter 11, "Data and Disk Management"

Two appendixes are also included:

- Appendix A, "Software Technical Support"
- Appendix B, "Application Examples"

Conventions and Typography

- In this manual, the terms *Neurotravel*, *Neurotravel Win*, and *software* are treated as synonyms.
- In general, a minimal amount of special fonts are used in this manual—*italics* for definitions or newly introduced terms, ***boldface italics*** for important concepts, and **boldface** for command paths (such as **Help > Index**) or file paths (for example, **D:\Neurotravel\Eeg_for_Windows\DATA**).

Additional Information

Two different methods are used to convey additional information: notes and cautions.

Note: This indicates information that may be helpful in understanding Neurotravel Win operations.

Caution!: *This denotes important information that, if unheeded, could hinder Neurotravel Win use.*

Support, Repair, and Documentation

- For Neurotravel Win software support, see Appendix A.
- For online updates to this book, check EGI's Documentation page at www.egi.com/documentation.html. Related manuals also available at that site include:
  - *Geodesic Sensor Net Technical Manual*: descriptions of EGI's patented, geodesic-based device for acquiring electrical signals from the human scalp.
  - *EGI Systems Technical Manual*: descriptions of all the hardware needed to acquire EEG data, excluding the Geodesic Sensor Net.

Opening and Closing Neurotravel Win

You can launch Neurotravel Win in various ways:

Application icon

- Double-click on the Neurotravel icon on the Desktop.
- Select the Neurotravel icon on the Desktop and press the Enter button.
- Right-click on the Neurotravel icon on the Desktop and select Open.
- Open the Start menu and choose Neurotravel.

To close the program using the mouse, choose **EEG > Exit** or click the Close ("X") button in the top-right corner of the window. If you are in the middle of recording, a window will prompt you to save your work before exiting from the application.

chapter 1

INSTALLING NEUROTRAVEL WIN

Neurotravel Win is shipped ***already installed*** on your EEG System, which uses a Dell Dimension 8400 PC as the data-acquisition computer. The instructions in this chapter are provided in case a problem occurs and you must reinstall the software. Instructions are also included for installing the optional VideoEEG feature. All cabling diagrams containing a PC back panel refer to the Dell Dimension 8400.

Before reinstallation, you must uninstall previous versions of the software and its required drivers (a *driver* is a program that controls a device). This chapter provides uninstallation instructions, installation instructions, and installation troubleshooting tips.

Note: Please carefully follow the instructions regarding when to connect the Neurotravel amplifier and hardware key to the data-acquisition computer.

Uninstalling the Hardware-Key Drivers

To uninstall the hardware-key system drivers:

1. Remove all SuperPro hardware keys.

2. Open the Start menu and choose Control Panel (Figure 1-1).

Figure 1-1. Opening the Windows control panel

3 In the Windows control panel window, double-click on the Add or Remove Programs icon (Figure 1-2) to open the Add or Remove Programs window.

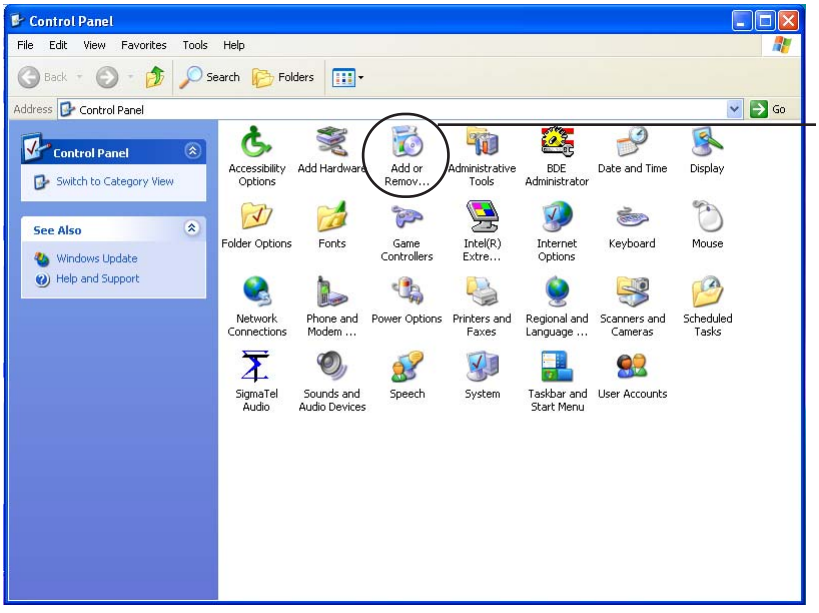


Figure 1-2. Windows control panel

4 In the Add or Remove Programs window, click on the Sentinel System Driver program and click the Remove button (Figure 1-3).

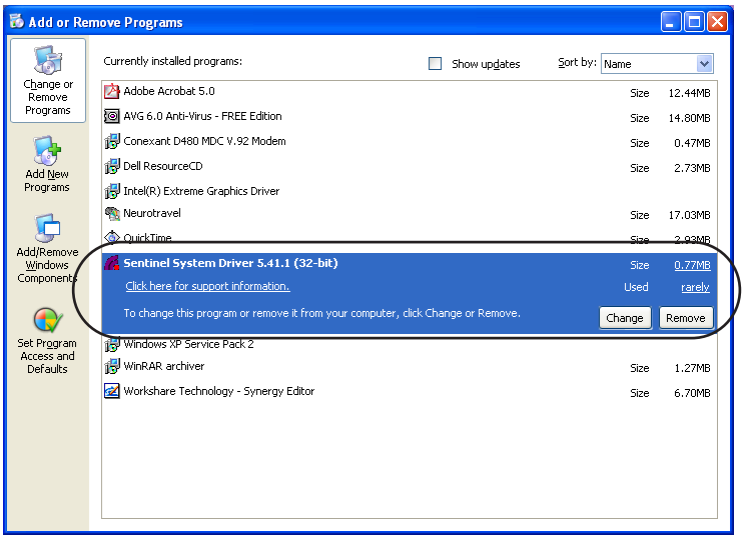


Figure 1-3. Remove the Sentinel System Driver

5 In the remove dialog that appears, click Yes (Figure 1-4).

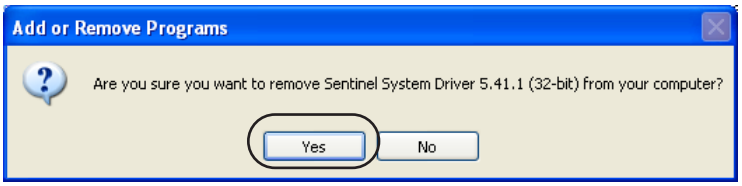


Figure 1-4. Confirm the removal

Uninstalling Neurotravel Win

Uninstalling erases program folders and all their contents.

Therefore, before uninstalling Neurotravel Win, copy the entire DATA folder (located at **D:\Neurotravel\Eeg_for_Windows\DATA**) to a temporary folder. Failure to do so will result in irreversible data loss, including the patient and exam databases. After installation, replace the installed DATA file with the copied one.

For information about routine backing up and maintenance of the Neurotravel database, see "Database Management Tools" on page 230.

To uninstall Neurotravel Win:

1. Return to the Add or Remove Programs window.

2. Select Neurotravel and click the Change/Remove button (Figure 1-5).

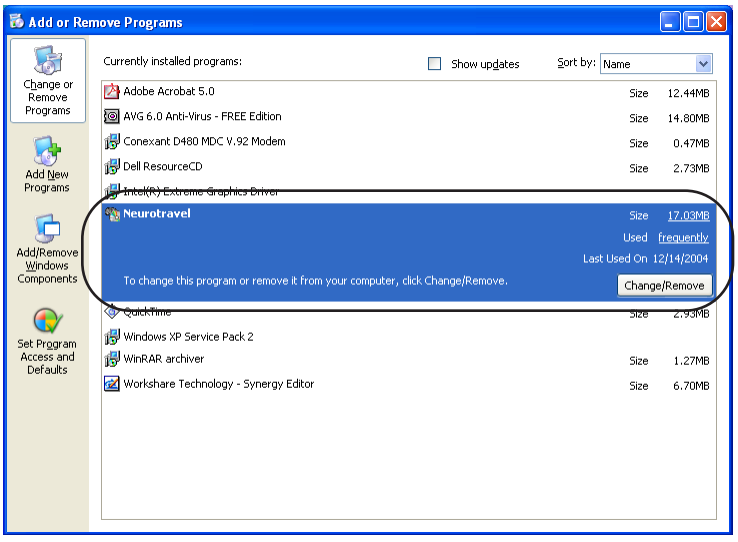


Figure 1-5. Remove Neurotravel

3 In the remove dialog that appears, click Yes (Figure 1-6).

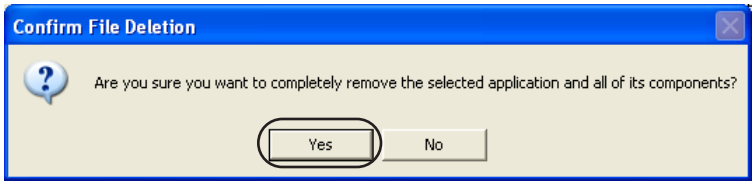


Figure 1-6. Confirm the removal

Note: A Remove Shared Files window may appear; if so, click Yes if it is OK to delete the shared files.

4 A progress window appears, indicating the status of the program removal; click OK when the uninstallation is complete (Figure 1-7).

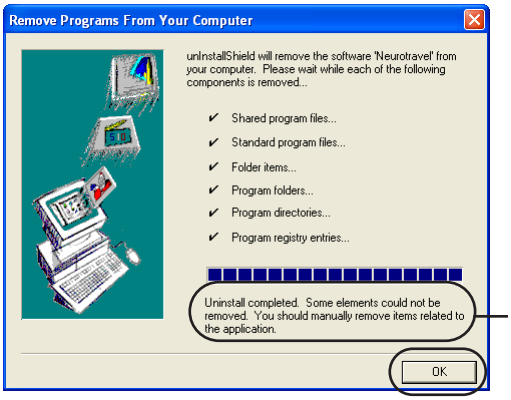


Figure 1-7. Close the uninstallation window

Configuring Your Computer

Before installing Neurotravel Win, configure your computer to accept the amplifier and hardware-key drivers. You must have Administrator privileges to do this.

1 Open the Start menu and choose Control Panel (Figure 1-8).

Figure 1-8. Opening the Windows control panel

2 In the Windows control panel window, double-click on the System icon to open the System Properties window (Figure 1-9).

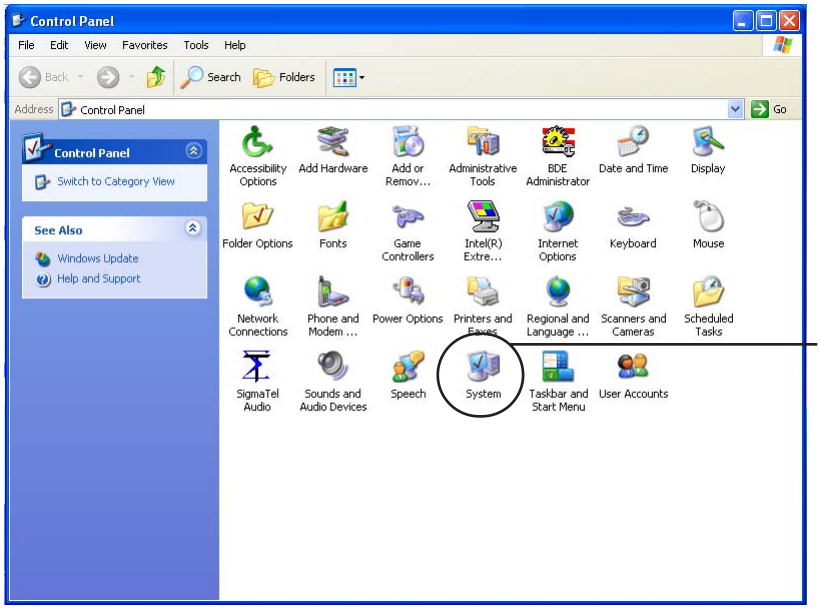


Figure 1-9. Windows control panel

3 In the System Properties dialog that appears, click the Hardware tab to view the Hardware pane (Figure 1-10).

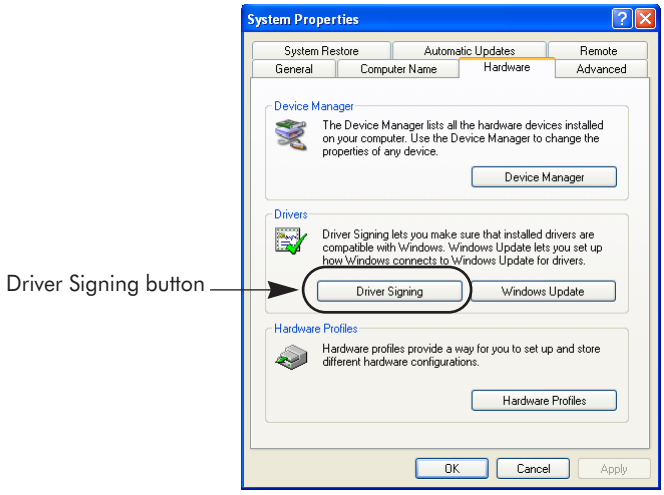


Figure 1-10. Hardware pane of the System Properties dialog

4 In the Drivers section of the Hardware pane, click the Driver Signing button, to open the Driver Signing Options dialog (Figure 1-11).

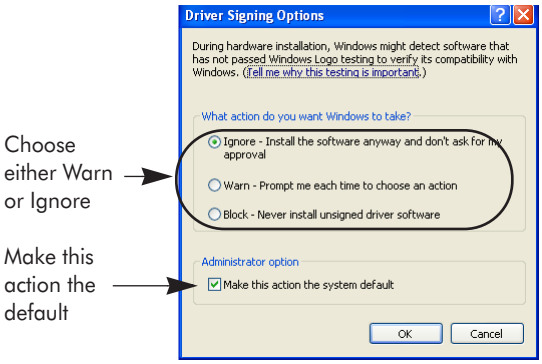


Figure 1-11. Driver Signing Options dialog

5 In the "What action do you want Windows to take?" section, choose either Warn or Ignore.

- *Warn*: Prompts you each time Windows detects software that has not passed Windows Logo testing.
- *Ignore*: Installs the software automatically.

6 In the "Administrator option" section, select the "Make this action the system default" checkbox and click the OK button.

7 Click the Close ("X") button in the top-right corner of the window when finished.

Installing the Hardware-Key Drivers

A hardware key is provided with the Neurotravel installation CD. This key (sometimes called a *dongle*) is a security device that contains passwords and codes for accessing licensed software, such as Neurotravel Win. ***The serial numbers on the key and the Neurotravel installation CD must match*** (see Figure 1-12 for the locations of these numbers). This ensures that only licensed owners can use all of the application's features.

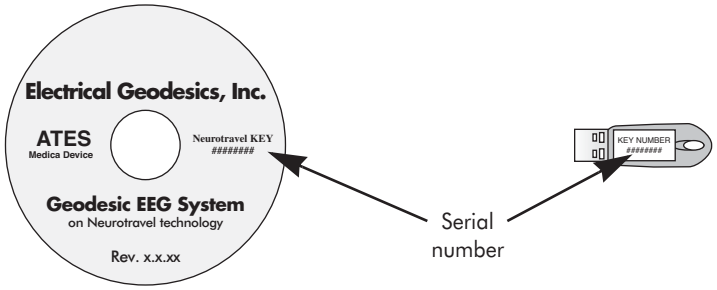


Figure 1-12. Serial numbers on installation CD (left) and hardware key (right)

Note: Remove all hardware keys before installing or removing the hardware-key drivers.

To install the hardware-key drivers:

1 Insert the Neurotravel installation CD into the DVD-RAM drive.

2 The program manager software tool (ATES Medica Device) automatically appears (Figure 1-13). (The Release Notes PDF file also automatically opens; close or minimize it. If you do not have Adobe Acrobat installed, click on Acrobat Reader in the program manager.)

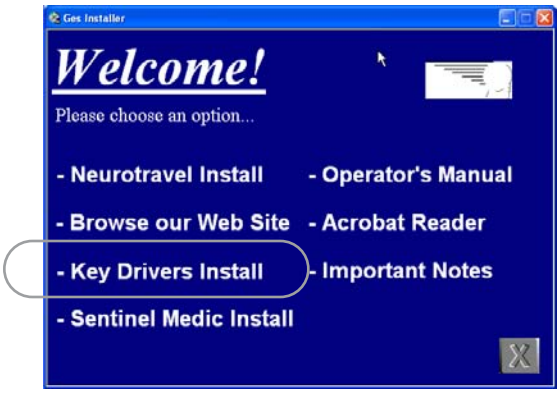


Figure 1-13. Program manager

(If the manager does not automatically appear, open the Start menu and choose My Computer; in the resulting My Computer window, double-click on the GES icon in Drive F [Figure 1-14], to open the program manager manually.)

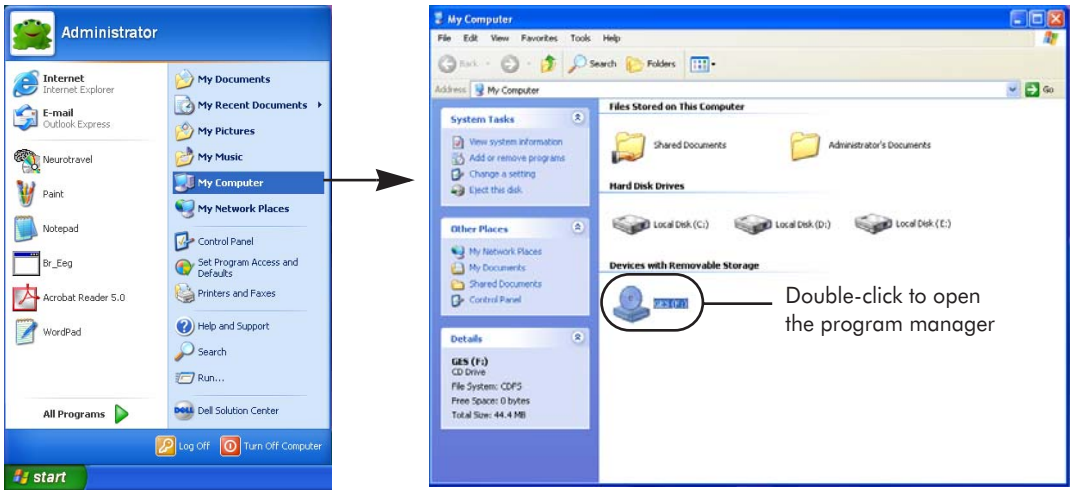


Figure 1-14. Open the program manager manually

3 In the program manager, click on Key Drivers Install (see Figure 1-13), to open the first of a sequence of windows that leads you through the installation; the default settings are recommended (Figure 1-15). If the software detects an older version of the drivers, choose to update.

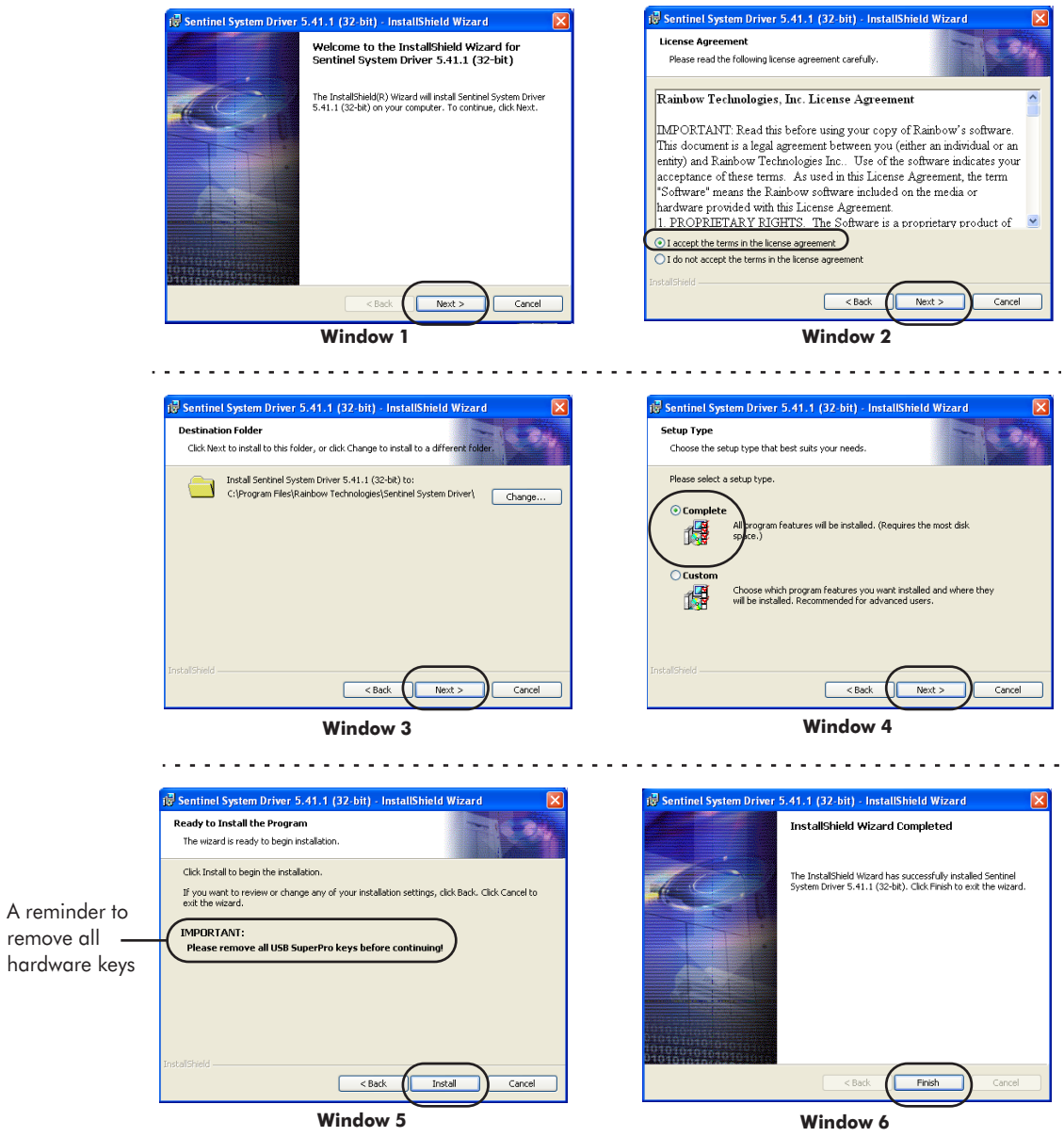


Figure 1-15. Hardware-key installation windows (with defaults circled)

4 If the Found New Hardware Wizard program does ***not*** appear, go directly to Step 8.

If it ***does*** appear, then in the Found New Hardware Wizard window, choose the automatic installation option (Figure 1-16). (If Windows is unable to locate the driver, specify the location: D:\Neurotravel\Eeg_for_Windows\Driver\Ntvldev.inf.)

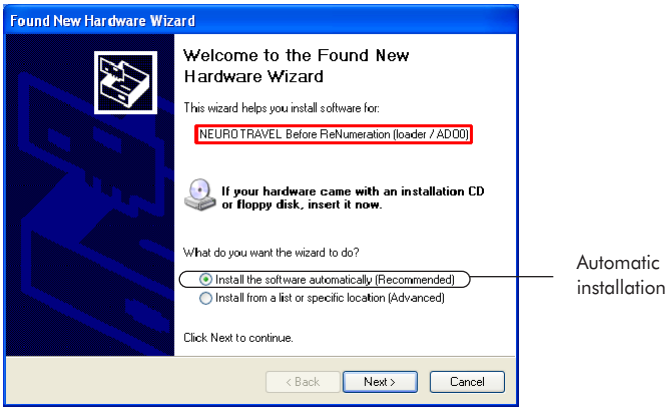


Figure 1-16. Found New Hardware Wizard

5 If the Hardware Warning dialog (Figure 1-17) appears, click the Continue Anyway button; a confirmation dialog appears, and Windows restarts the Found New Hardware Wizard program.

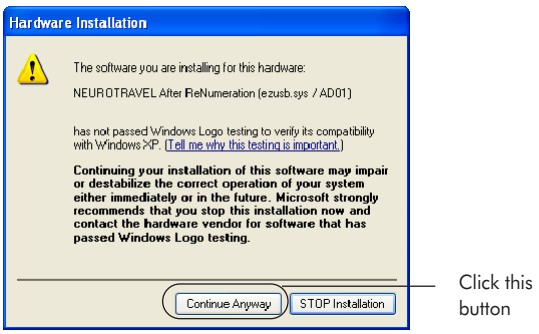


Figure 1-17. Hardware Warning

6 Again, choose the automatic installation option and follow the installation instructions.

7 If the Hardware Warning dialog appears again, click the Continue Anyway button and complete the automatic installation sequence.

8 Insert the hardware key into one of the available USB ports on your computer.

9 After it recognizes the hardware key, Windows displays two identification messages, in sequence (Figure 1-18).

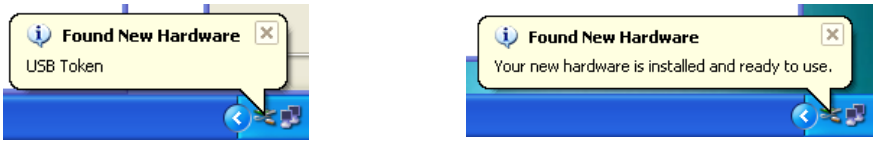


Figure 1-18. Found New Hardware messages

Installing the Neurotravel Software

Note: Ensure that no amplifiers are connected before installing Neurotravel Win.

To install the Neurotravel software properly on your PC hard disk:

1 Click Neurotravel Install in the program manager (Figure 1-19).

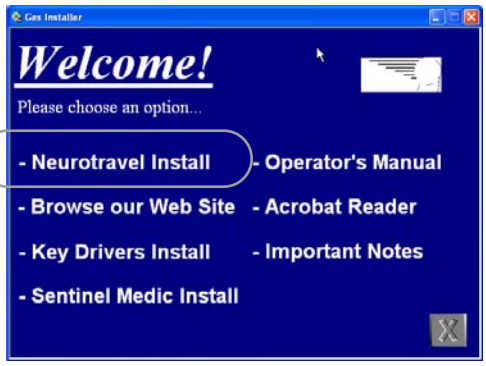


Figure 1-19. Program manager

(If the manager is not still open, open the Start menu and choose My Computer; in the resulting My Computer window, double-click on the GES icon in Drive F [Figure 1-20], to open the program manager manually. The Release Notes PDF file also automatically opens; close or minimize it. If you do not have Adobe Acrobat installed, click on Acrobat Reader in the program manager.)

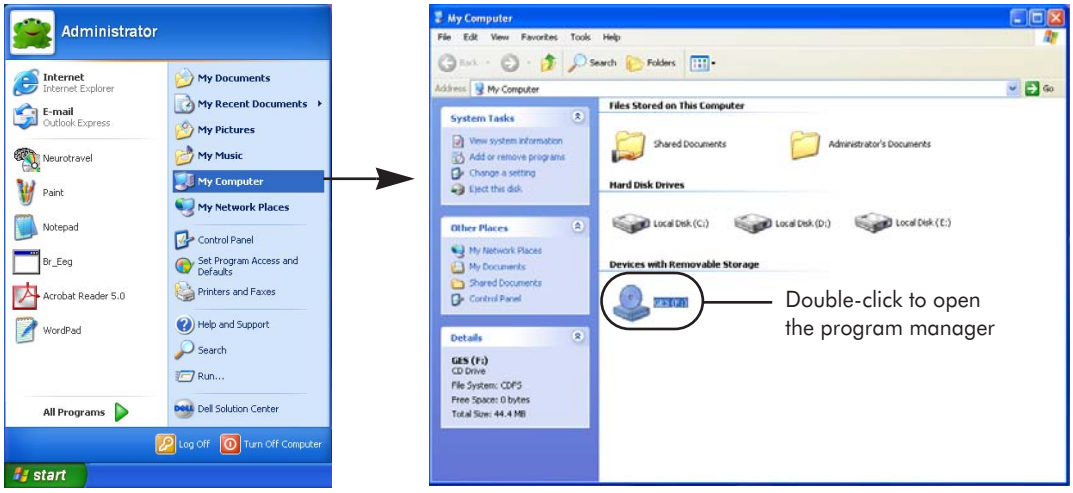


Figure 1-20. Open the program manager manually

2 Select the installation options, as prompted (Figure 1-21). (The default settings are recommended.)

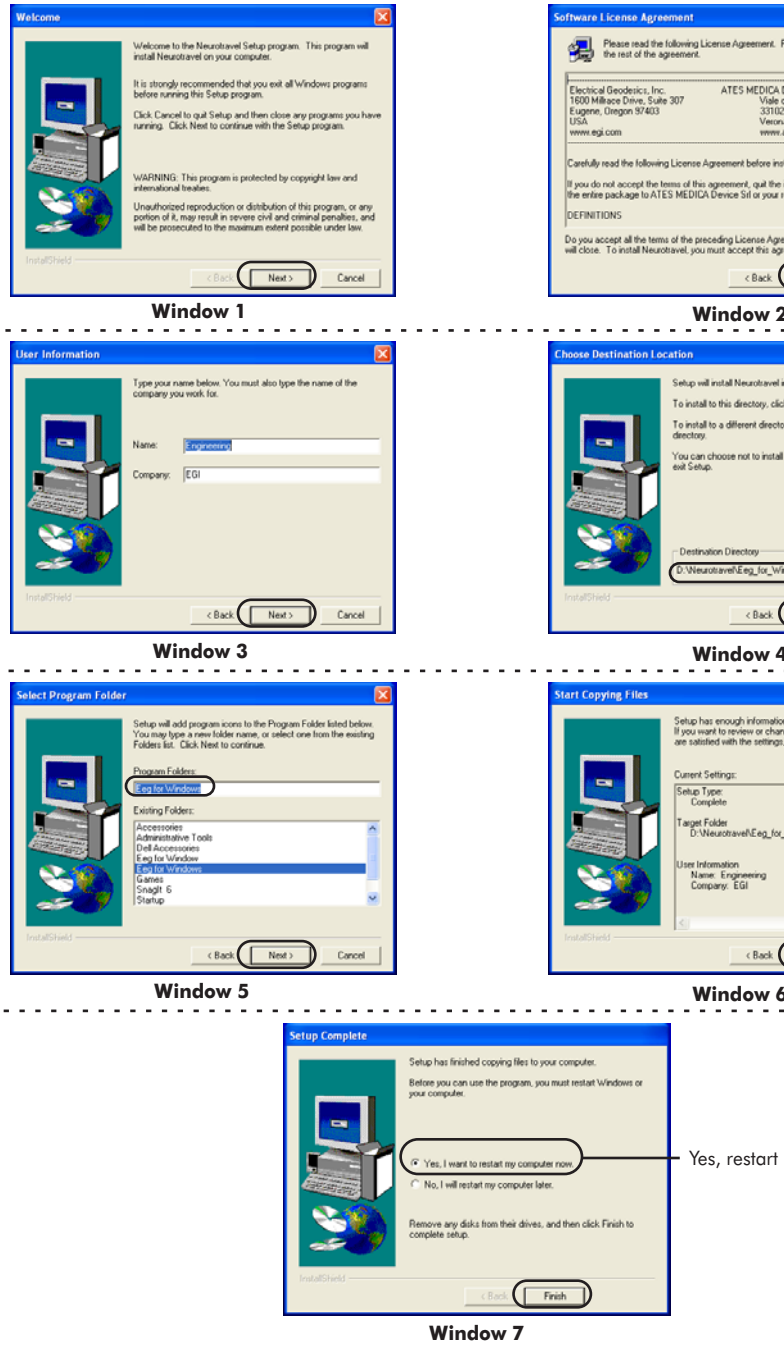


Figure 1-21. Neurotravel installation steps (with defaults circled)

3 Window 7 in Figure 1-21 recommends a restart after the installation; select this option and click Finish.

4 After the restart, open the program manager by opening the Start menu and choosing My Computer; in the resulting My Computer window, double-click on the GES icon in Drive F (Figure 1-22), to open the program manager manually. (The Release Notes PDF file also automatically opens; close or minimize it. If you do not have Adobe Acrobat installed, click on Acrobat Reader in the program manager.)

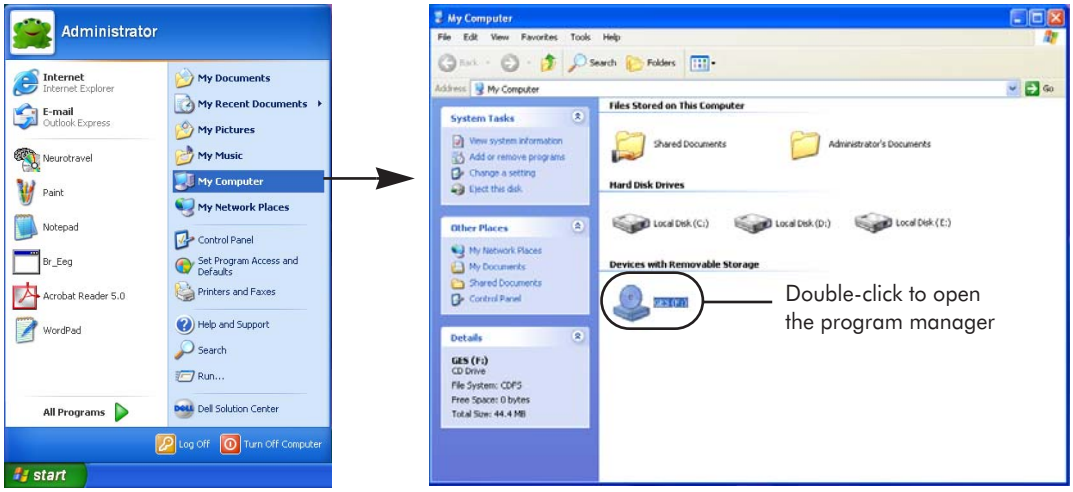


Figure 1-22. Open the program manager manually

5 Use the supplied USB cable to connect the Neurotravel amplifier to one of the computer's USB ports; Figure 1-23.

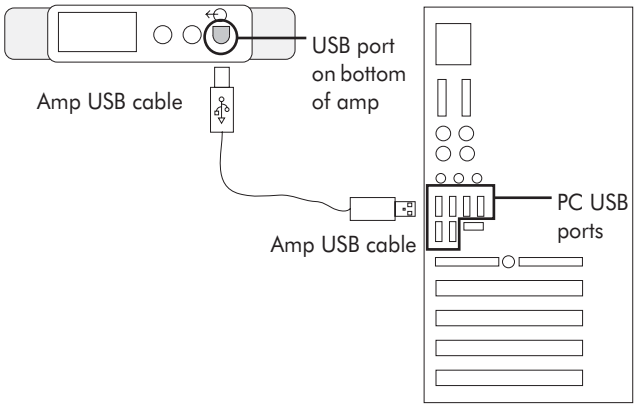


Figure 1-23. Amp USB connections

6 If the Found New Hardware Wizard program does ***not*** appear, go directly to Step 10.

If it ***does*** appear, then in the Found New Hardware Wizard window, choose the automatic installation option (Figure 1-24). (If Windows is unable to locate the driver, specify the location: D:\Neurotravel\Eeg_for_Windows\Driver\Ntvldev.inf.)

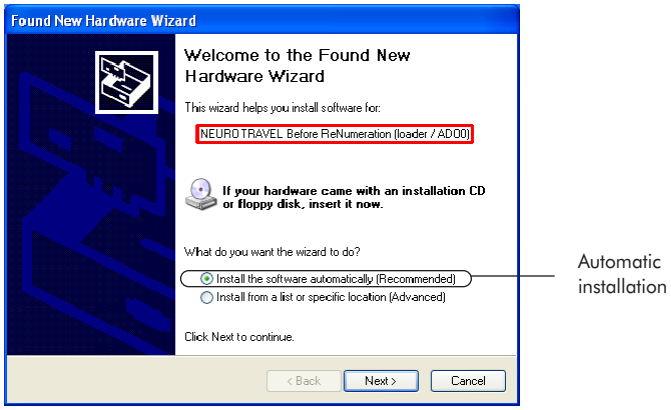


Figure 1-24. Found New Hardware Wizard

7 If the Hardware Warning dialog (Figure 1-25) appears, click the Continue Anyway button; a confirmation dialog appears, and Windows restarts the Found New Hardware Wizard program.

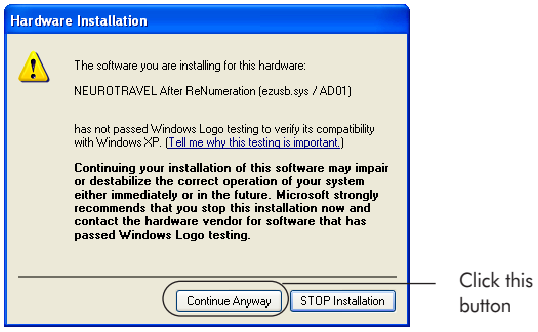


Figure 1-25. Hardware Warning

8 Again, choose the automatic installation option and follow the installation instructions.

9 If the Hardware Warning dialog appears again, click the Continue Anyway button and complete the automatic installation sequence.

10 A message listing the System name displays in the amplifier readout screen (Figure 1-26); this indicates that your system is ready for use.

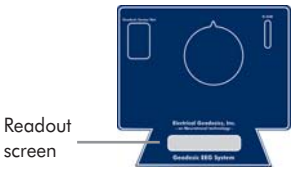


Figure 1-26. Amp readout

11 Replace the DATA folder at **D:\Neurotravel\Eeg_for_Windows** with the one you copied earlier that contains your database files.

Caution!: *If you change the destination folder during the installation (window 4 of Figure 1-21), you must modify the route in the System Configuration dialog (choose* ***Options > System****, click the Common tab) after you first start the Neurotravel application. The exam files must have their own folder, called "DATA," inside the Neurotravel software installation folder. For example, if Neurotravel is installed on* ***D:\Neurotravel\Eeg_for_Windows****, then the Data Files Path should be* ***D:\Neurotravel\Eeg_for_Windows\DATA*** *(Figure 1-27).*

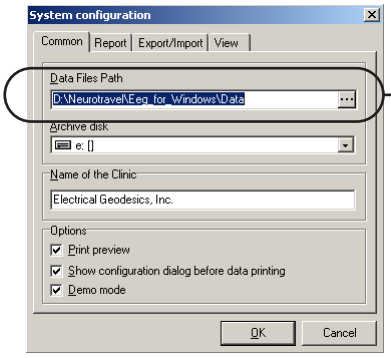


Figure 1-27. Data path

First Start with Neurotravel

When you first start Neurotravel after the installation, check that the log-in window and system connections are set up correctly.

1 Start Neurotravel by double-clicking on the Neurotravel icon on the Desktop, which opens the Login dialog.

2 In the Login dialog, set the User Name to "sysadm" (Figure 1-28), leave the Password textbox empty, and click the Login button. (You can create user accounts later; see "System Users Window" on page 213.)

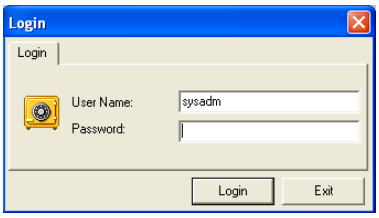


Figure 1-28. Login dialog

3 If your computer displays the "Device Not Ready" warning, check that the USB cable is properly connected between the amplifier and the computer (see Figure 1-23 on page 38). Also, check that the amplifier drivers are properly installed: click the Device Manager button in the Hardware pane of the System Properties dialog (see Figure 1-10 on page 29), and ensure that the device is recognized and that the drivers are installed and enabled.

If your computer displays no warning, the Acquisition window automatically appears (Figure 1-29).

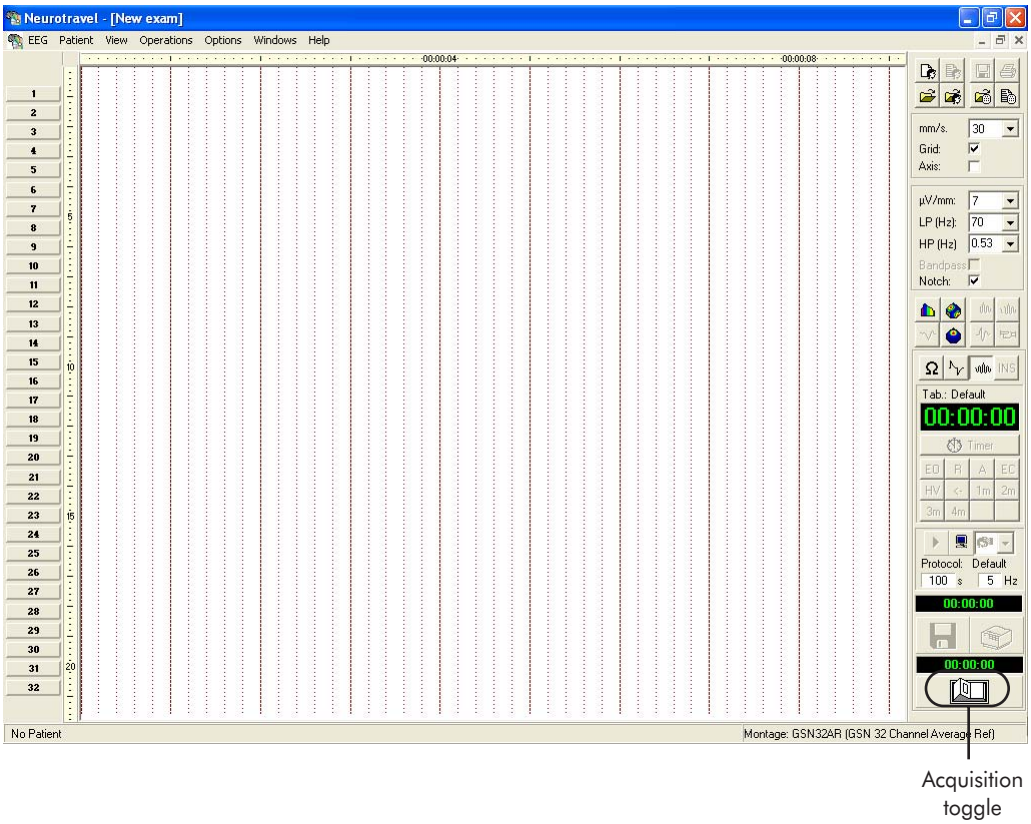


Figure 1-29. Acquisition window

4 If you wish to begin acquiring signals, click the Acquisition toggle at the bottom of the Acquisition control panel.

Running Sentinel SuperPro Medic

The Neurotravel installation CD contains the Sentinel SuperPro Medic program, for diagnosing problems with the hardware key or the computer setup. It is a simple graphical user interface that finds any SuperPro hardware keys plugged into a system or a network. This tool is necessary only if you are troubleshooting hardware-key problems.

To run Sentinel SuperPro Medic:

1 Manually open the program manager, by opening the Start menu and choosing My Computer; in the resulting My Computer window, double-click on the GES icon in Drive F (Figure 1-30).

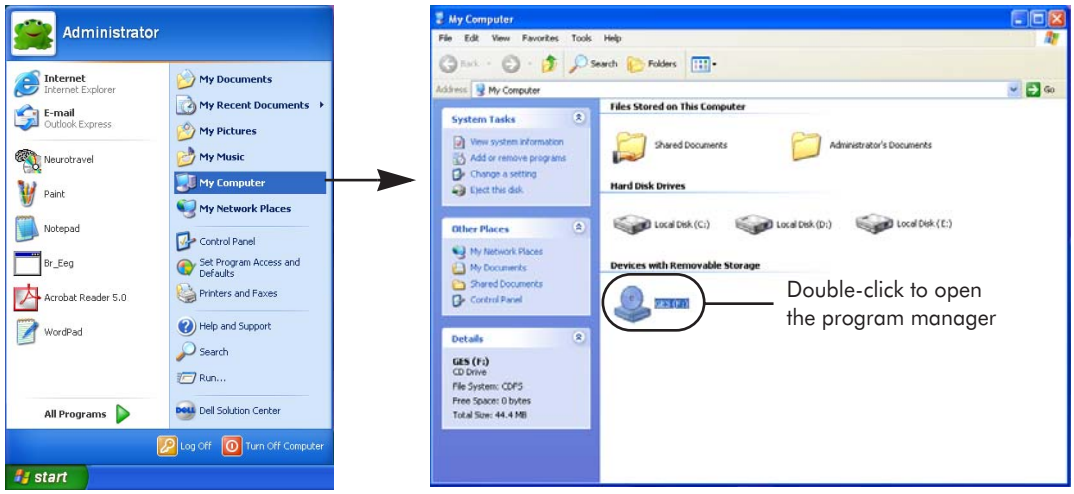


Figure 1-30. Open the program manager manually

2 In the program manager, click on Sentinel Medic Install (Figure 1-31), to open the first window of the installation wizard program.

Figure 1-31. Program manager

3 In the first window of the installation program, click Next (Figure 1-32).

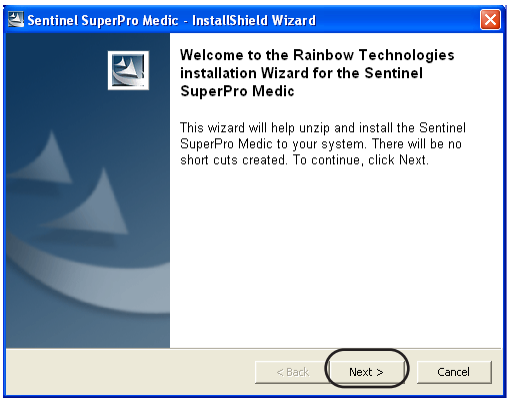


Figure 1-32. Sentinel Medic installation window

4 In the second window (Figure 1-33), select a destination for the program files and click Next.

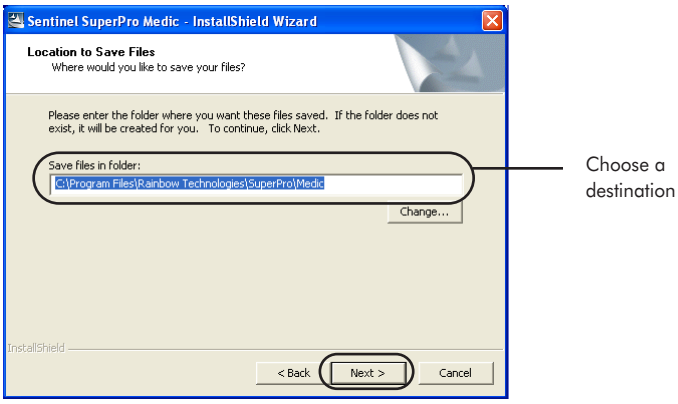


Figure 1-33. Destination for program files

Note: If a dialog indicating that the program is already installed on your computer appears, you can choose to overwrite the installed program, if you wish.

5 In the Sentinel SuperPro Medic interface that appears (Figure 1-34), open the Server Name/IP or Mode pop-up menu to specify the search type for connected hardware keys.

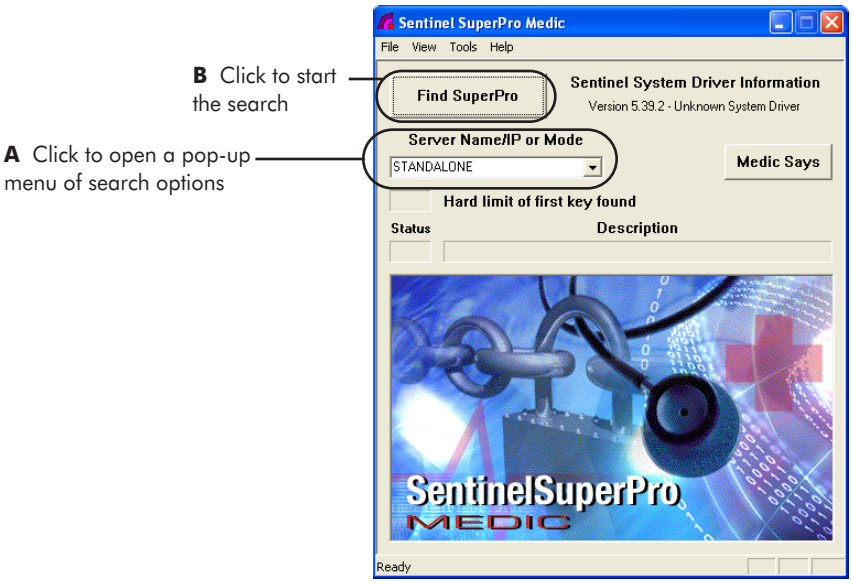


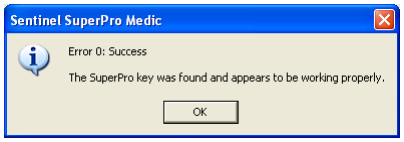
Figure 1-34. Sentinel SuperPro Medic interface

- *Stand-alone*: Searches the local system for all SuperPro keys attached to the local system driver.
- *Local*: Searches the local system for all SuperPro keys attached to the locally running SuperPro server.
- *Network*: Searches the entire viewable subnetwork and report on the number of SuperPro keys found.
- *Computer on a network*: Searches for SuperPro keys plugged into a specific computer on the network, when you type an IP address or computer name in the text box.

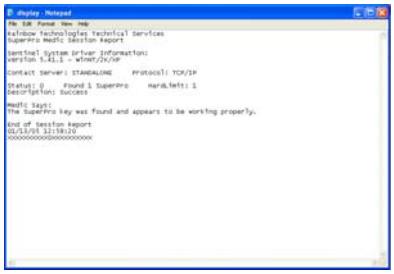
6 After specifying the type of search, click the Find SuperPro button (see Figure 1-34); a results dialog appears (Figure 1-35).

Figure 1-35. SuperPro search results

7 To test any keys found by the search, click the Medic Says button, which produces a brief text message explaining the test results (Figure 1-36; left). (Choose **Tools > Display Session Info** to create a Notepad text file summarizing the test results in more detail; Figure 1-36, right.)



Message from the Medic Says function



Message from the Tools menu

Figure 1-36. More details about found keys

Installing the VideoEEG Kit

The VideoEEG kit is an optional feature. If you did not purchase this kit, it will not be present in the Neurotravel installation CD's program manager. If you did purchase the kit:

1. In the program manager, click VideoEEG Kit.
2. Accept all the default settings in the installation windows that appear.
3. At the end of the installation, remove the Neurotravel installation CD and shut down your computer.
4. Turn off the computer using its on/off switch.
5. Open your computer case, firmly insert the XPress Video Acquisition card into an empty PCI slot, and close the case.
6. Turn on the computer using its on/off switch, and start your computer.
7. Detecting the XPress video card, Windows opens the first window of the Found New Hardware Wizard program (Figure 1-37); proceed through the installation windows, choosing the automatic installation and the default values.

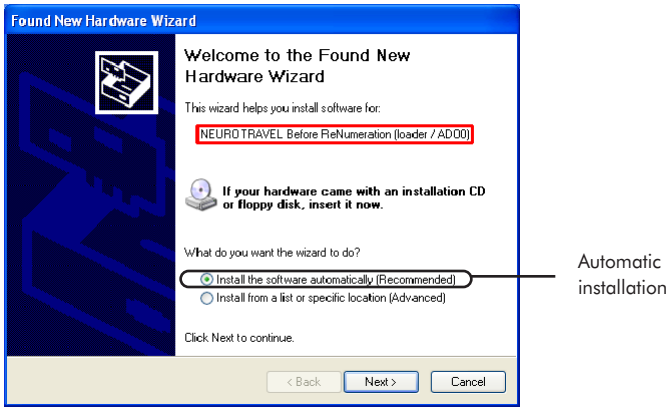


Figure 1-37. Found New Hardware Wizard

8 If a Hardware Installation warning appears, click the Continue Anyway button (Figure 1-38).

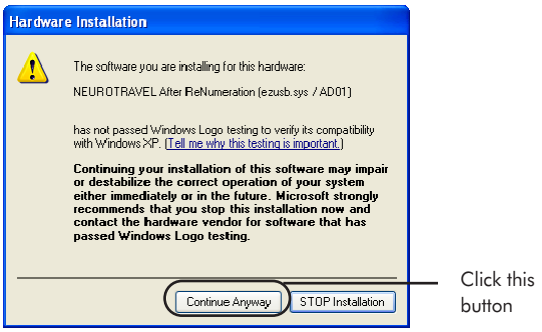


Figure 1-38. Hardware Warning

9 After a confirmation message appears, restart the computer.

10 Connect the coaxial cable from the video-camera output to the number 1 input port on the back of the XPress video card (Figure 1-39 shows this and other system cabling).

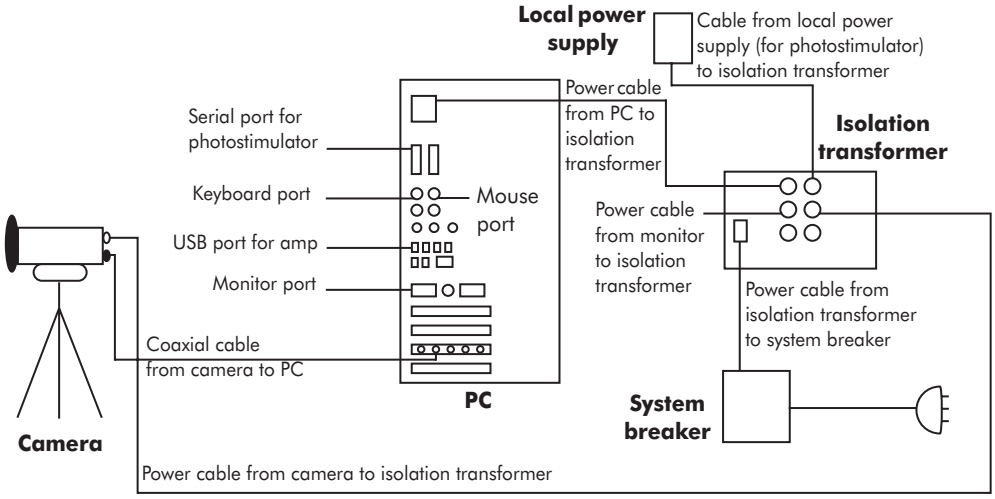


Figure 1-39. Cabling for a VideoEEG system

11 Choose **Start > All Programs > XPress > XVCR**, to open the XVCR window.

12 In the XVCR window, choose **Tools > Settings** and accept the following default settings:

- *Standard*: PAL
- *Type*: Composite
- *Frame Size*: 15,000
- *Camera*: 1
- *Record Limit*: unselected
- *Frame Rate*: 30 frames/second

13 Click OK, to view a video image in the XVCR window.

14 Start Neurotravel.

15 In the Acquisition control panel, click the VideoEEG button, to open the VideoEEG window (Figure 1-40); move the window to a corner of the Acquisition window.

VideoEEG button

Figure 1-40. VideoEEG window

16 Click the Acquisition toggle to begin video–EEG acquisition.

Note: To record a video file with the EEG file, you must always open the VideoEEG window before recording an EEG exam.

Installation Troubleshooting

This section provides solutions to problems that might occur during any of the installation processes.

Hardware Key

Hardware Key Not Found

This message appears before the Login dialog if there is a problem accessing the SuperPro hardware key.

Solution: Follow these instructions, checking after each step to see if the problem has been fixed.

- Make sure that the hardware key is inserted correctly into the computer's USB port (see Figure 1-23 on page 38 for the locations of the PC's USB ports).
- Make sure that the Sentinel System Driver is installed. Double-click on the Add/Remove Programs icon in the Windows control panel to view the list of installed programs. If the Sentinel System Driver is not installed, see "Installing the Hardware-Key Drivers" on page 31.
- Make sure that the serial number on the hardware key matches the number on the Neurotravel installation CD (see Figure 1-12 on page 31).
- Check the Windows Device Manager to make sure that the hardware key is enabled, and that the Sentinel System Driver is functioning properly.
- Use the Sentinel SuperPro Medic program to find and test the hardware key (see "Running Sentinel SuperPro Medic" on page 43).
- Contact EGI Support (Appendix A), if the hardware key is damaged.

License Loading

Error Loading Program

This message appears before the Login dialog if there is a problem loading the Neurotravel protected-program license.

Solution: Follow these instructions, checking after each step to see if the problem has been fixed.

- Use the Sentinel SuperPro Medic program to find and test the hardware key (see "Running Sentinel SuperPro Medic" on page 43).
- Contact EGI Support (Appendix A), if the hardware key is damaged.

Neurotravel Amplifier

Warning Message; Device Not Ready

This message appears before the Login dialog if there is a problem accessing the Neurotravel amplifier.

Solution: Follow these instructions, checking after each step to see if the problem has been fixed.

- Make sure that the USB cable is properly connected between the USB output port on the bottom of the amplifier (type B) and the USB port on the computer (type A). Disconnect and reconnect the cable (see Figure 1-23 on page 38).
- Contact EGI Support (Appendix A), if the USB cable is connected properly but the warning message is still displayed.

VideoEEG Kit

Warning Message; Unable to Locate Component

This message appears before the Login dialog if there is a problem accessing the XPRESS.DLL file when the VideoEEG option is enabled.

Solution: Follow this suggestion.

- Make sure that the XPress Video System components are properly installed and configured (see "Installing the VideoEEG Kit" on page 47).

Warning Message; Error in VideoEEG

This message appears after you click the VideoEEG button in the Acquisition control panel. The message indicates that there is a problem initiating the XPress Video System.

Solution: Follow this suggestion.

- Make sure that the XPress Video Acquisition PCI card is properly installed in the computer and enabled in the Windows Device Manager (see "Installing the VideoEEG Kit" on page 47).

The VideoEEG Window Is Black

This problem occurs if the video coaxial cable is connected to the wrong input port on the back of the XPress Video Acquisition PCI card.

Solution: Follow this suggestion.

- Make sure that the cable is connected to port 1 on the XPress video card (see Figure 1-39 on page 48 for the location of port 1).
- Make sure that port 1 is selected as the camera input in the XPress XVCR Settings window (see "Installing the VideoEEG Kit" on page 47).

chapter 2

PROCESS OVERVIEW

Neurotravel Win contains streamlined features to safeguard against error in the clinical environment. Before delving into the specific acquisition, review, and archiving tools of Neurotravel Win, however, you should be aware of three of these clinician-friendly features:

- a linear system routine
- unfiltered recorded data
- the Options menu

This chapter introduces you to each feature.

Linear System Routine

The acquisition, recording, reviewing, and archiving steps follow a linear pattern. This structure minimizes the chances of mistakes being made. Figure 2-1 provides an illustration of the Neurotravel Win operations discussed in this manual.

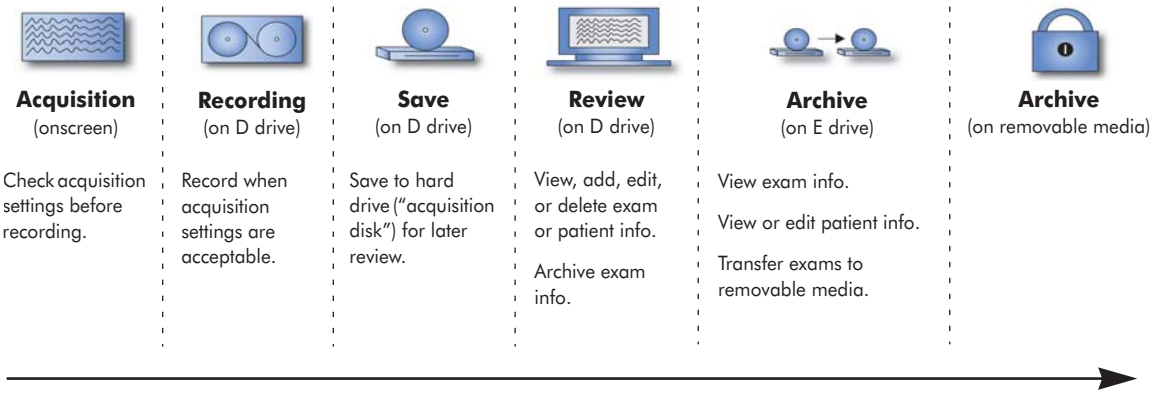


Figure 2-1. The linear Neurotravel process

As Figure 2-1 shows, each step must be completed before you can proceed to the next step. Also, although not indicated in the figure, a physician must sign-off on an exam before it can be archived.

Example Applications

This manual describes the software features and functions. For an overview of how to use them during routine clinical exams, see Appendix B, "Application Examples," which describes acquiring, recording, viewing, and archiving EEG data using Neurotravel Win.

After reading this manual, but before using the software, EGI strongly recommends reading Appendix B.

Unfiltered Recorded Data

Although you can apply filters during the acquisition and review modes, the filters do ***not*** alter the data; they only affect how the data are *displayed*. This ensures the integrity of the acquired EEG data.

The Options Menu

The Options menu (Figure 2-2) allows you to define general settings, including display grids and colors, printing parameters, maximum recording time, acquisition definitions (such as electrodes acquired), and other overall specifications.

Parameters set in the Options menu persist from exam to exam; consequently, EGI recommends establishing them during system setup, so that they remain consistent across exams. You can change the parameters at any time, but should probably consult colleagues before doing so.

Figure 2-2. Options menu

The full Options menu is discussed in detail in Chapter 9, "Options Menu." Before acquiring data, go to Chapter 9, which provides step-by-step instructions on how to define the following system settings:

- Color codes for EEG, navigation, map, and spectrum features
- Display pixel-height resolution
- Acquisition and review parameters, including grid width, whether the highpass filter is in Hertz or seconds, and so forth
- Print parameters, such as what kind of patient information to include in the printouts

- Notch-filter frequency for your country (50 Hz in Europe; 60 Hz in North America and other countries; 50 Hz in some regions in Japan, and 60 Hz in other regions in Japan)
- Sampling rate
- Calibration voltage
- Electrodes from which to acquire signals
- Recording time
- Event tables
- Montages
- Automatic photostimulator programs
- Frequency bands
- Keyboard shortcuts
- System user privileges
- Paths for the data recording and archiving, to the external editor, and for exporting and importing
- Display options of the status bar, and the horizontal control panel

Note: The EP Schemes menu item, shown in Figure 2-2 on page 55, is optional and not included with your System.

chapter 3

Neurotravel Win Interface Basics

Neurotravel Win's graphical user interface consists of pop-up menus, windows, panels, buttons, and status bars designed to make acquiring, recording, and archiving EEG data intuitive and easy. The software is visually based, allowing you to use the mouse or keyboard to manage all recording, storage, and printing commands and options. This ease of use facilitates quick and accurate EEG data recording and analysis.

This chapter introduces the interface elements, starting with the main components of the Neurotravel window and proceeding through brief descriptions of the general element types. Dialogs and the mouse are also discussed.

The Neurotravel Window

Neurotravel Win's graphical user interface consists of six main components:

- Title bar
- Menu bar
- Control panel
- Montage status bar
- Patient status bar
- Trace area

Figure 3-1 shows the locations of these elements in the Neurotravel window.

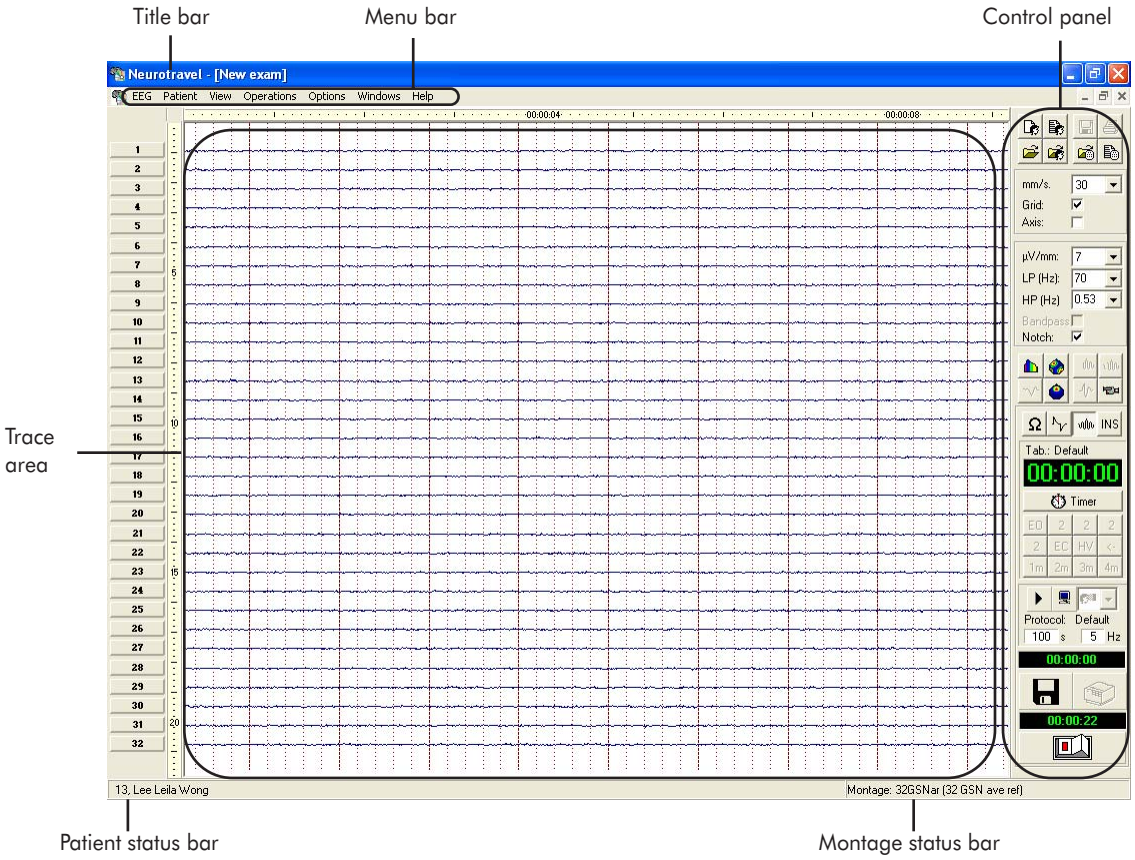


Figure 3-1. The six main components of the Neurotravel window

Title Bar

The title bar, in the top-left corner, displays identifying information for the current exam. For a saved exam, this includes the patient code, patient name, exam number, date and time of the exam, and the exam duration. For an exam in acquisition mode, the title bar displays "New exam" (Figure 3-2).

Title bar in acquisition mode (data are *not* saved yet; no exam information to display)

Title bar in review mode (data *are* saved; full exam information is displayed)

Figure 3-2. Title bar, in acquisition (top) and review (bottom) mode

Menu Bar

The menu bar, which is under the title bar, contains the EEG, Patient, View, Operations, Options, Windows, and Help menus (Figure 3-3).

Note: For basic operations, the control panel (described on page 63) is preferred because it is more accessible than the menu bar. However, some operations, such as exam archiving, require the menu bar.

Figure 3-3. Menu bar

Accessing Menu Items

Open a menu using either the mouse or the keyboard:

- *Mouse*: Click on the menu name.
- *Keyboard*: Press the Alt key to reveal the underlined letters of the menu names (for example, E for EEG). Press the letter for the menu name (E) to open the menu (Figure 3-4).

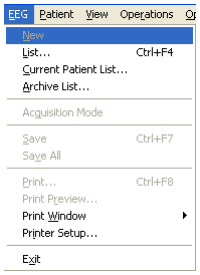


Figure 3-4. Key letters of the menus and commands are underlined, when the Alt key is pressed

To choose a command from the menu (which will cause another window or menu to appear):

- Continue using either the mouse, or the keyboard technique just described (that is, the Alt key method).
- Or press an up or down arrow key to navigate to the desired command; then, press the Enter key.

Individual Menus

Almost all the menus and their commands are referred to throughout the manual, with some described in depth (the Options menu, for one). Following, then, are just brief descriptions of each menu and command.

EEG Menu

This menu contains commands related to EEG exams.

- *New*: creates a new exam
- *List*: displays a list of all recorded exams on the acquisition disk
- *Current Patient List*: displays a list of all the exams of only the current patient
- *Archive List*: displays a list of all archived exams
- *Acquisition Mode*: initiates acquisition of traces
- *Save*: records the current unsaved exam to the acquisition disk
- *Save All*: records the current unsaved exam and video (if applicable) to the acquisition disk
- *Print*: prints the current exam
- *Print Preview*: provides a representation of the printout, in advance
- *Print Window*: prints only the active window
- *Printer Setup*: allows you to choose a printer and its properties
- *Exit*: closes the Neurotravel Win application

Patient Menu

This menu contains commands related to patient records.

- *New*: creates a new patient record
- *List*: displays a list of all patient records
- *Edit Current*: allows you to edit the current patient record

View Menu

This menu contains commands related to the visualization of EEG exam data.

- *Analysis*: applies automatic-calculation tools to the current EEG exam for displaying spectral brain maps, channel spectrum, or coherence spectra
- *Video EEG*: initiates the display and recording of a video of the patient, along with the EEG
- *Measurements*: displays the Measurements palette

- *Amplitudes*: applies and displays amplitude maps of the current EEG exam
- *Event List*: displays a list of the events, and the times they occurred, in the exam
- *Navigator Bar*: displays the navigation bar
- *Horizontal Control Panel*: displays the control panel horizontally
- *Status Bar*: displays or hides the patient and montage status bars (described on page 64)

Operations Menu

This menu contains commands related to software operations.

- *Acquisition*: initiates an acquisition session
- *Record*: saves current EEG data to the acquisition disk
- *Print (Thermal)*: prints EEG traces to a real-time thermal printer, if connected
- *Test Electrodes*: measures the electrode impedances
- *Stimulator*: initiates photostimulator activity
- *Auto*: sets the photostimulator mode to automatic operation
- *Manual*: sets the photostimulator mode to manual operation
- *Data Archive*: allows you to archive selected exams
- *Data Export*: allows you to export EEG data to selected formats
- *Data Import*: allows you to import data (in selected formats) for use with Neurotravel Win
- *Delete Exam*: permanently removes an exam from the Neurotravel database
- *Delete Signal Portion*: permanently removes selected data from a trace area
- *Word Template*: initiates the generation of an exam report

Options Menu

This menu contains commands related to establishing various global settings.

- *Display*: allows you to define how the data are displayed (for example, color-coding)
- *Print:* enables you to specify what information to include in the printouts
- *Filters*: allows you to specify the value for the notch filter
- *Acquisition*: enables you to specify whether all or selected channel data are recorded, and to set the sampling rate and calibration voltage
- *Record Time*: allows you to set a maximum recording duration
- *Event*: opens a menu that allows you to create, choose, or edit an event set
- *Montage*: opens a menu that allows you to create, choose, or edit a montage

- *Frequency Bands*: opens a menu that allows you to create, choose, or edit a set of frequency bands
- *EP Schemes*: unavailable
- *Photostimulator*: allows you to create, choose, or edit a photostimulator protocol
- *Hot Keys*: allows you to create keyboard shortcuts
- *System Users*: enables a system administrator to add, delete, or edit user privileges
- *System*: allows you to set up system defaults, such as automatic print preview, and export and import options
- *System Info*: shows the number of patients and exams in the database, and the number of archived exams

Windows Menu

This menu contains commands related to how multiple open windows are displayed.

- *Cascade*: diagonally overlays the display of windows so that all the title bars are visible
- *Tile Horizontally*: overlays windows so that they can be viewed horizontally
- *Tile Vertically*: overlays windows so that they can be viewed vertically
- *Arrange Icons*: displays icons in specified order
- *Close*: closes the current Neurotravel window
- *Close* All: closes all open Neurotravel windows
- <*exam name*>: indicates the names of the open Neurotravel windows

Help Menu

This menu contains commands related to assisting the user.

- *Index*: opens a PDF version of this manual
- *About*: displays a window indicating Neurotravel Win's name, version number, and manufacturer

Figure 3-5. Control panel, in acquisition mode

Control Panel

The control panel (Figure 3-5) contains all the buttons to control the printer, photostimulator, and traces displayed onscreen. The panel is typically displayed vertically, but it can be horizontal; choose **Option> System > View** and select the Horizontal Status Bar checkbox. (Some controls are missing from the horizontal version; this section describes the default, vertical version.)

The control panel changes according to the current operational phase. For example, during acquisition, the control panel contains acquisition controls that are unavailable during review (see "Acquisition Control Panel" on page 72 and "Review Control Panel" on page 99).

The control panel consists of buttons, value selectors, indicators, and timers.

Buttons

Two types of buttons are available: *toggle* and *immediate* (Figure 3-6). A toggle button makes a command operative (for example, run) until you click the button again. An immediate button opens windows or executes commands that are operative for a short time only.

Choose a button by clicking on it with the mouse.

Figure 3-6. Buttons

Value Selectors

Value selectors allow you to choose a value, such as a filter type or a sensitivity, from a prearranged list (Figure 3-7).

Choose a value selector using either the mouse or the keyboard:

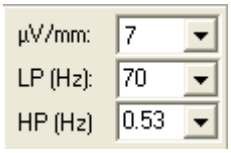


Figure 3-7. Value selectors

- *Mouse*: Click the disclosure triangle to open the prearranged list and select the desired item.
- *Keyboard*: Press the Tab key to cycle through the value selectors in the control panel. When the cursor is in the desired value selector, press an up or down arrow key to cycle through the prearranged list of values. When the correct value is highlighted, press the Tab key.

Indicators

Indicators provide additional information, such as the event table currently in use (Figure 3-8).

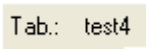


Figure 3-8. Indicates the current event table

Timers

A timer is a clock that indicates a time measurement according to a specified time mode (Figure 3-9).

In the control panel, a timer is located at the bottom, directly above the Acquisition toggle. The timer indicates the acquisition duration, in hours:minutes:seconds.

While recording, a timer directly over the Record toggle (also at the bottom) indicates the duration of the recorded exam, in hours:minutes:seconds.

Timer (acquisition)

Timer (record)

Figure 3-9. Timers

Montage Status Bar

The montage status bar, in the bottom-right of the window, indicates which montage is currently being used to acquire or review an exam (Figure 3-10).

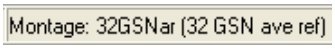


Figure 3-10. Montage status bar

(You can hide this bar and the patient status bar by choosing **Options > System > View** and deselecting the Status Bar checkbox.)

Patient Status Bar

The patient status bar, in the bottom-left of the window, displays the identifying code and name of the patient whose *patient file* is currently active (Figure 3-11).

Figure 3-11. Patient status bar

(You can hide this bar and the patient status bar by choosing **Options > System > View** and deselecting the Status Bar checkbox.)

Note that the patient status bar can display one patient name, and the title bar can display a different patient name. This is because the software produces two types of files: patient and EEG. The patient status bar is linked to the patient database archive, and the title bar is linked to the exam database archive. (See Chapter 11, "Data and Disk Management," for more information.)

To ensure that both status bars correspond to the same patient, open an exam from *within* the desired patient record. (See Chapter 8, "Patient Menu," for information about how to access and edit patient files from the database.)

Trace Area

The trace area, which occupies most of the window, displays the acquired EEG signals, scrolling from right to left (Figure 3-12). Two vertical grids (spaced either 15 or 30 millimeters apart) and a horizontal grid (spaced at each channel) are available to enhance readability. (See "Display Configuration" on page 180 for more information.)

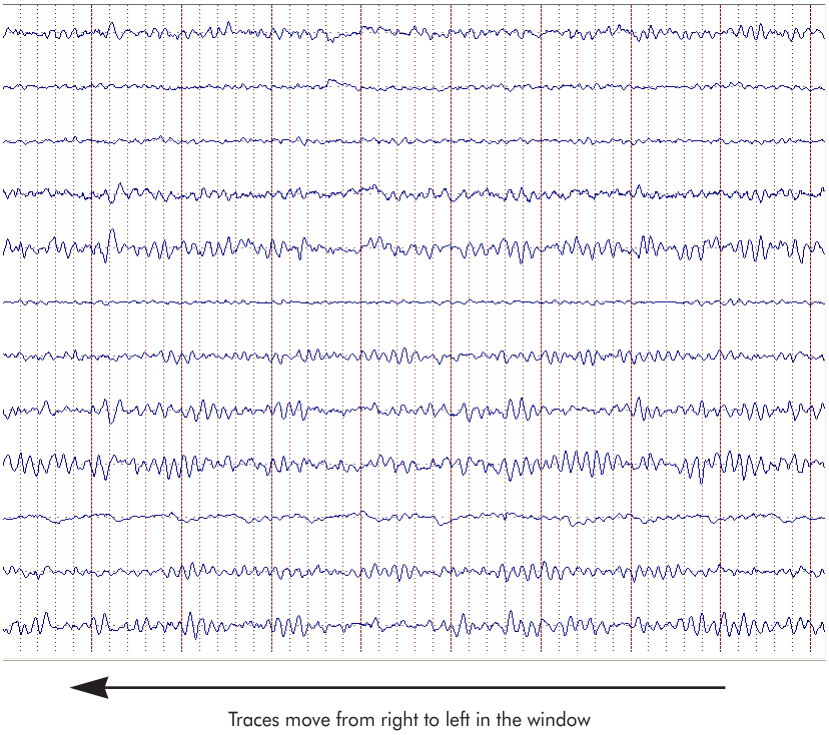


Figure 3-12. Trace area

Dialogs

Dialogs are temporarily displayed windows requiring additional information to complete a computer operation (see Figure 3-13 for examples). Typically, they disappear once you click an OK or Close command button.

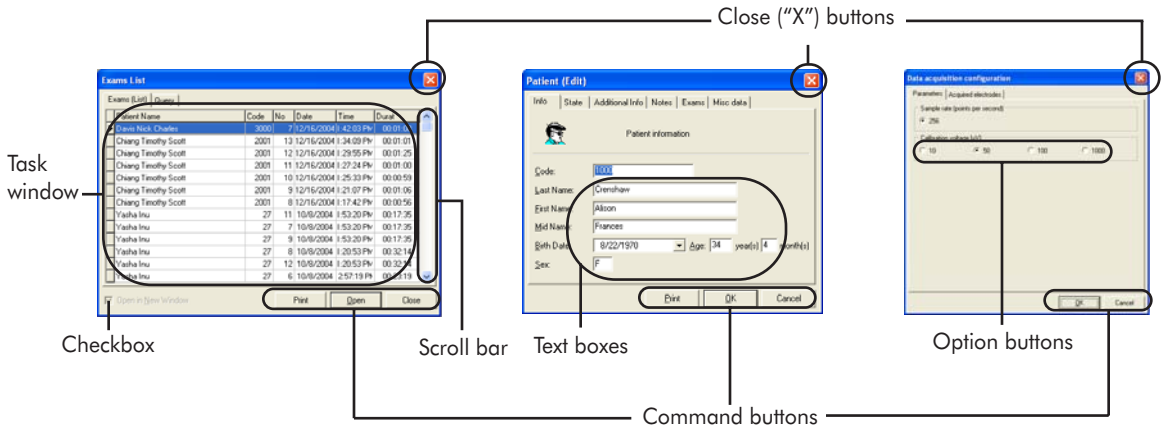


Figure 3-13. Sample dialogs

Dialogs can consist of command buttons, task windows, text boxes, option buttons, checkboxes, and scroll bars. Each of these elements is described in the following paragraphs and illustrated in Figure 3-13. Almost all these elements are accessible through either the mouse or the keyboard.

To navigate and select items in a dialog:

- *Mouse*: Click on the desired element.
- *Keyboard*: Press the Tab key to move from one element to another (a black border will usually indicate that an element is selected; Figure 3-14). (Note that pressing Shift-Tab will move you in the opposite direction as pressing Tab does.) Press the Enter key to make an element operative.

Figure 3-14. The black border around the C4 button indicates it is selected

Each dialog has a feature for quickly closing the window, without saving changes. To close a dialog:

- *Mouse*: Click the Close ("X") button to dismiss the window and cancel the performed modifications.

- *Keyboard*: Press the Esc key to close the window and cancel the performed modifications.

Command Buttons

Use the command buttons to execute immediate commands (for example, OK, Cancel), answer program questions (Yes, No), or open other windows. Each dialog usually contains an OK button and a Cancel button. (The Esc key on the keyboard is similar to the Cancel button.)

To execute a command:

- *Mouse*: Move the cursor over the desired button and click.
- *Keyboard*: Press the Tab key until the desired button is selected onscreen, and press the Enter key.

Task Windows

Task windows contain lists of selectable items (for example, patients in the database, recorded or archived exams, available montages).

To select an item:

- *Mouse*: Double-click on the item in the list. (Or click to select an item and click the Open button.) If the list is too long to display all its items, drag the scroll bar on the right side of the window to reveal the hidden items.
- *Keyboard*: Press the arrow keys to move to the desired item and press the Enter key to select it (here, the Enter key is similar to the Open button).

Text Boxes

Text boxes are editable boxes designed to hold information typed by the user (for example, the text boxes in a new-patient record).

- To activate a text box, click in it. A flashing line will appear, indicating that typing may begin.
- To replace old text, select the text and type the new information.

Option Buttons

Option buttons are groups of items that exclude one another; selecting one option automatically excludes the others (for example, you can choose only one value from the four available for setting the voltage of the calibration signal in the Data Acquisition Configuration window, in the Options menu).

To select an option button:

- *Mouse*: Click the desired item.
- *Keyboard*: Press the Tab key to move to the group of options. To select the desired item, press an arrow key to navigate to it and press the Space bar to choose it.

Checkboxes

Checkboxes are a list of possible options that you can turn on or off. Unlike with option buttons, you can select all the necessary boxes at the same time. A selected checkbox is marked with the "√" symbol.

To select a checkbox:

- *Mouse*: Click the desired item.
- *Keyboard*: Press the Tab key to move to the desired box and press the Space bar to choose it.

Scroll Bars

Scroll bars are boxes placed within the right and bottom frames of the window. They are designed to allow you to navigate through a file, either quickly or incrementally. You can access these elements only with the mouse.

- To navigate through a file *quickly,* drag the scroll bar until you reach the desired location.
- To navigate through a file *incrementally,* click the arrows in the bottom-right corner of the window.

Using the Mouse

By pressing the right mouse key, you can perform many of the functions described in this manual. Such operations are often context-dependent, and their display windows differ in appearance.

Some functions can be accessed only through a right-click (adding an event during the review phase, for instance; Figure 3-15).

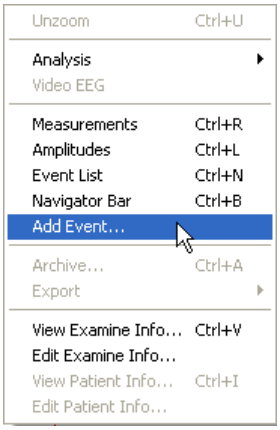


Figure 3-15. Pop-up menu with Add Event command is available only with a right-click

chapter 4

ACQUISITION AND RECORDING

Acquisition toggle

When you first open Neurotravel Win, the window is automatically set up for EEG trace acquisition. Click the Acquisition toggle (the button in the bottom-right corner; see Figure 4-1) to begin acquiring signals. Change the *appearance* of the signals by applying different montages and filters from the control panel; the actual data *recorded*, however, are unfiltered and based on the electrodes selected in the Acquired Electrodes pane of the Data Acquisition Configuration window in the Options menu (see "Data Acquisition Configuration" on page 189).

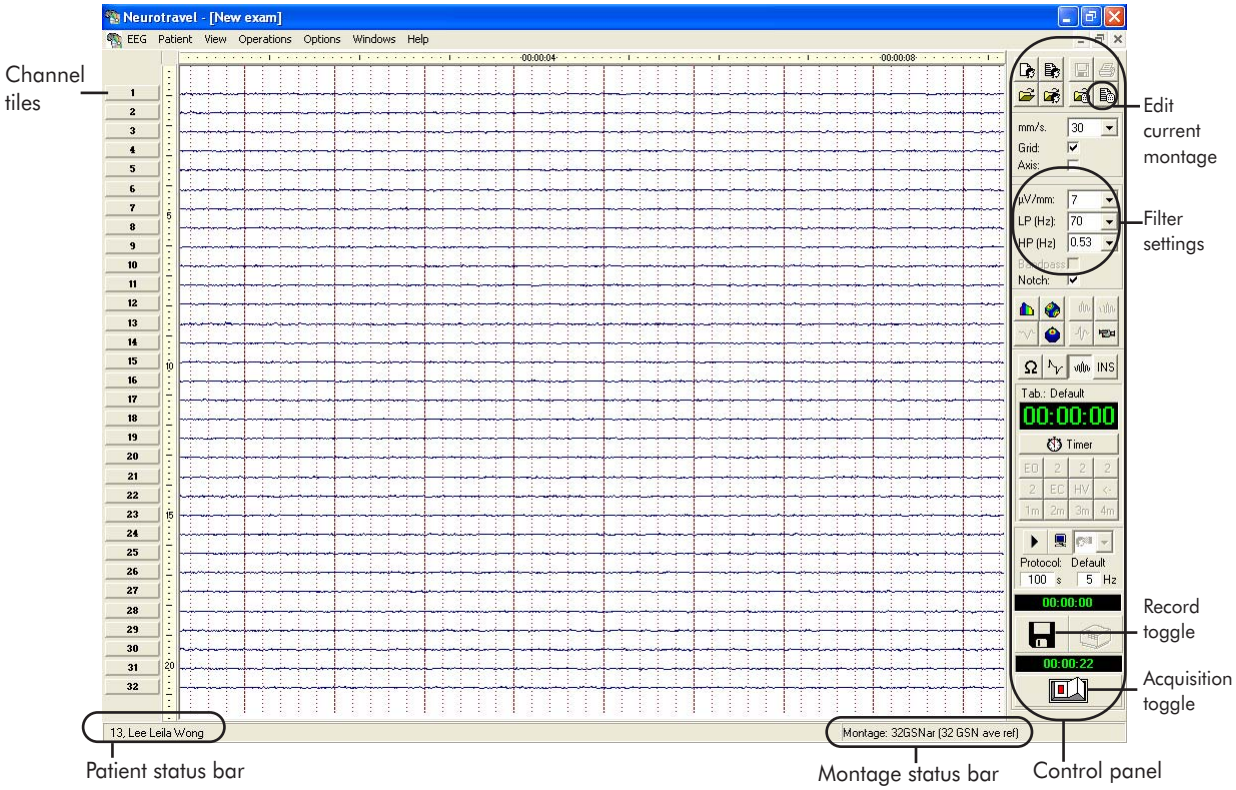


Figure 4-1. Control panel in acquisition mode

Record toggle

The acquisition mode does not record data to disk; it only obtains signals from the electrodes and displays them onscreen. Once you are satisfied with the acquisition settings, click the Record toggle—the "disk" button above the Acquisition toggle—to start recording.

You can initiate the acquisition and recording modes, even without patient data (that is, if the patient status bar reads "No Patient"). This is useful if a trauma patient is rushed in for an immediate EEG exam. You can enter the patient data later, while the patient is taken to the appropriate treatment room.

This chapter describes the features for acquiring, recording, and saving exams.

(For a brief list of acquisition procedures, see "Neurotravel Win Recording" and "Example EEG Acquisition/Recording" on page 239. For information about the disk, see "Acquisition Disk" on page 227.)

Acquisition Control Panel

Figure 4-2 shows the Acquisition control panel, in its default, vertical position.

(You can also display the panel horizontally, by choosing **Options > System > View** and selecting the Horizontal Control Panel checkbox. However, the horizontal version contains fewer controls than the vertical version; see "System Configuration Window" on page 215.)

The Acquisition control panel contains all the commands needed to acquire and record exams. These include buttons to start and stop acquisition, and to access the exam and patient databases. Other buttons control the filters, amplifier signals, event table, photostimulator, and various functions. Each is briefly described in this chapter.

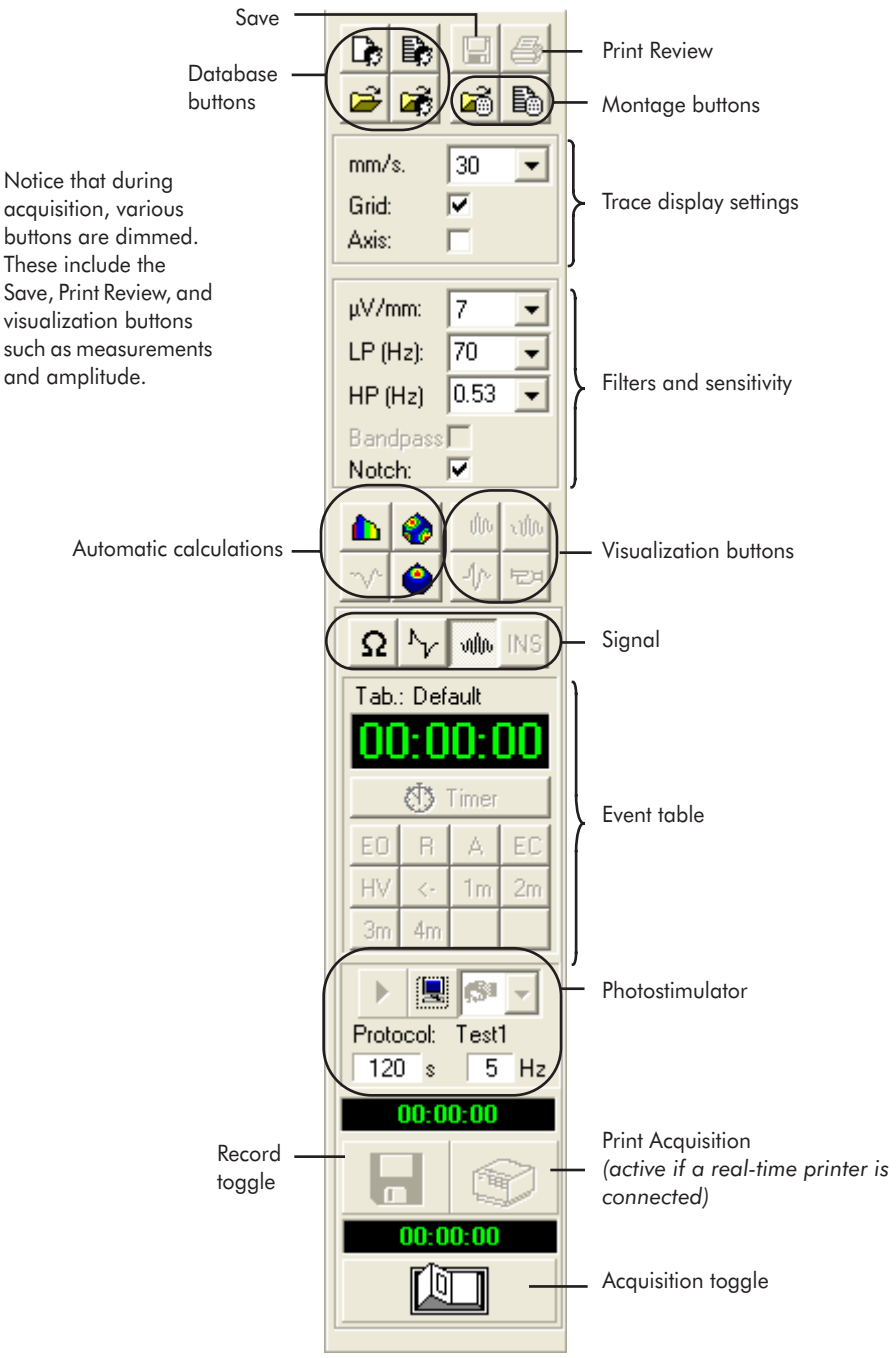


Figure 4-2. Acquisition control panel

Database Buttons

At the top left of the Acquisition control panel are buttons to access information from the exam and patient databases quickly (Figure 4-3). Typically, you create or select a patient record before clicking the Acquisition toggle (described in the next section).

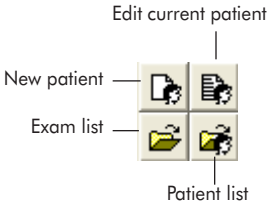


Figure 4-3. Database buttons

The four database buttons allow you to create a record for a new patient, edit the current patient record, open a list of all recorded exams, and open a list of all patients. (See Chapter 8, "Patient Menu," for more information.)

Acquisition Toggle

The Acquisition toggle (Figure 4-4), at the bottom of the Acquisition control panel, allows you to view signals from the electrodes selected in the Acquired Electrodes pane of the Data Acquisition Configuration window (in the Options menu; see page 189).

Figure 4-4. Acquisition toggle

The acquisition mode allows you to check electrode performance and to regulate filter sensitivity before clicking the Record toggle (see "Record Toggle and Exam Recording" on page 88).

Some buttons and menu commands are dimmed when Neurotravel Win is acquiring data (such as **Options > Events**). To make these buttons and commands available again, stop data acquisition by clicking the Acquisition toggle.

Trace-Display Settings

Near the top of the Acquisition control panel are selectors for the trace-display settings (Figure 4-5). The software displays the traces, from right to left. The trace-display buttons enable you to control the scrolling speed of the trace, and the use of vertical and horizontal guidelines.

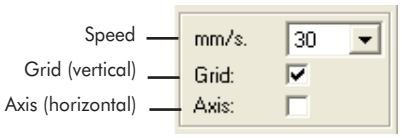


Figure 4-5. Trace-display settings

Use the top control to specify the speed of the traces displayed onscreen and printed on paper (if an optional real-time printer is connected). If the screen speed is linked to the real-time printer's speed and that printer is turned on, any changes to the onscreen speed will automatically affect the paper-scrolling speed.

Below the speed control are checkboxes for showing or hiding the guides in the trace area during scrolling. The Grid box refers to vertical guides, and the Axis box refers to horizontal guides that align with each channel.

Acquisition Montage Buttons

To the right of the database buttons (Figure 4-6) are the two acquisition montage buttons. The montage buttons allow you to specify how the electrode signals are displayed during acquisition and recording.

Figure 4-6. Montage buttons

- Click the "open" button to view a list of available montages. You can:
  - Select a montage from the list and apply it to the current exam.
  - Modify a montage by right-clicking on a montage name in the list, and choosing Edit from the resulting pop-up menu.
- Click the "new" button to create a new montage.

The montage affects only the *appearance* of the electrode signals. To specify which electrode signals are *recorded*, choose **Options > Acquisition** and click the Acquired Electrodes tab (Figure 4-7). This pane provides three options: individually selected electrodes, all, or those in the montage selected from the control panel. You should establish the Acquired Electrodes setting before acquiring data (see “The Options Menu” on page 55 and Chapter 9, "Options Menu”).

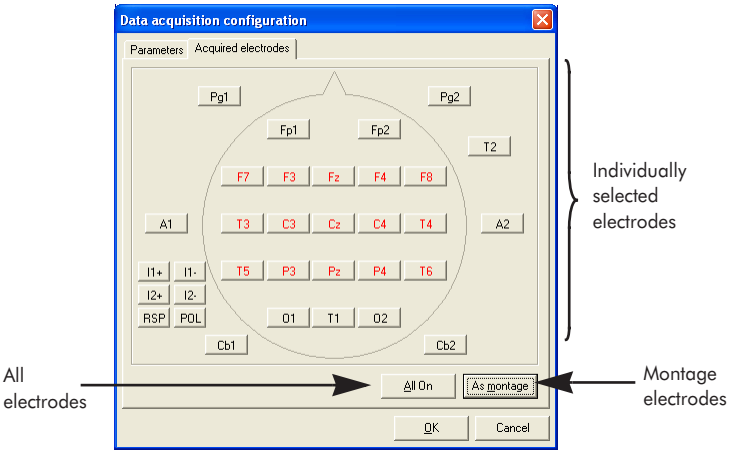


Figure 4-7. Acquisition montage settings

Filter Controls

In the upper half of the Acquisition control panel is a group of controls for applying the notch filter, specifying lowpass and highpass filter values, and defining filter sensitivity. These controls affect the *appearance* of the data onscreen and in the printouts; they do not affect the actual *recorded* data.

Notch Checkbox

Figure 4-8. Notch filter

The notch checkbox (Figure 4-8) enables you to insert and remove a filter that attenuates frequencies in a narrow band around the specified frequency, while passing frequencies outside the band. The notch filter is used to filter out 50 or 60 Hz power-line noise (Figure 4-9). In Europe, 50 Hz is the main power-supply frequency; in North America and other countries, the frequency is 60 Hz. (Japan is mixed; some regions use 50 Hz, others use 60 Hz.)

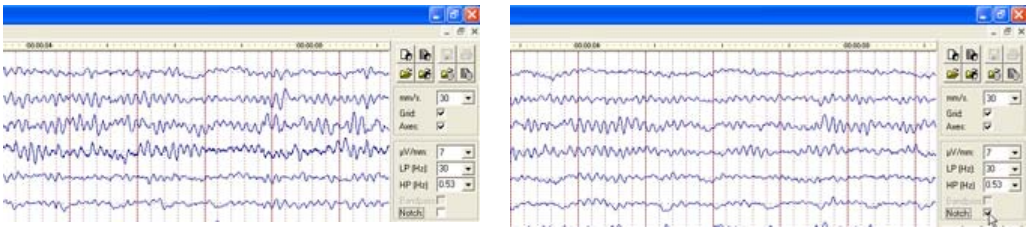


Figure 4-9. Notch filter, off (left) and on (right)

To select the notch filter setting, choose **Options > Filter** (Figure 4-10).

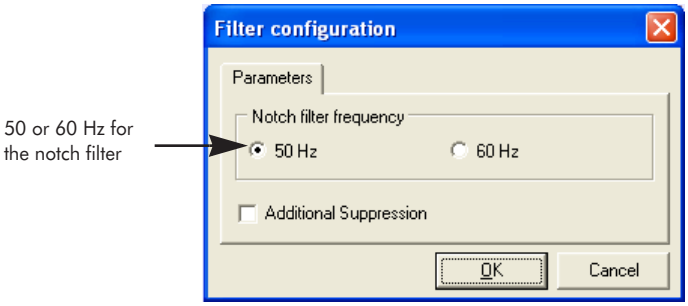


Figure 4-10. Select 50 or 60 Hz notch filter in the Filter Configuration window

Filter Selector Values

Above the notch checkbox is a group of selectors for specifying values for filter sensitivity, highpass filters, and lowpass filters for an EEG session (Figure 4-11).

The filter sensitivity selector opens a predefined list of values; you cannot define your own value by typing it into the text box. The lowpass and highpass filter selectors open predefined lists, but these text boxes can also accept user-defined values.

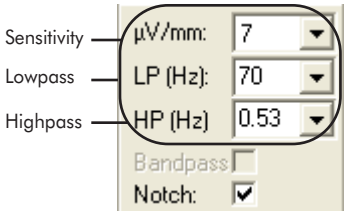


Figure 4-11. Filter controls

Global Values

The filter selectors allow you to apply "global" values, which means that they apply to all channels, unless otherwise specified. You can apply "specific" values to individual channels, which override the global values for those channels. In other words, *global* values do not affect any *specific* values defined for individual channels (which are described in the next section).

Specific Values

To define "specific" values for a channel, click on the channel tile (Figure 4-12), which opens the Parameters of Channel dialog (Figure 4-13).

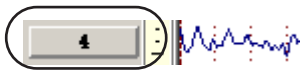


Figure 4-12. Channel tile

In the dialog, selecting a Loc checkbox allows you to define a "local" or specific value for filter sensitivity, highpass filter, lowpass filter, or signal color. Deselecting the Loc checkbox returns the filter or color setting to the global value.

The On and Off option buttons in the dialog enable you to turn "on" or "off" the signal display (an "off" channel is represented by a flat line).

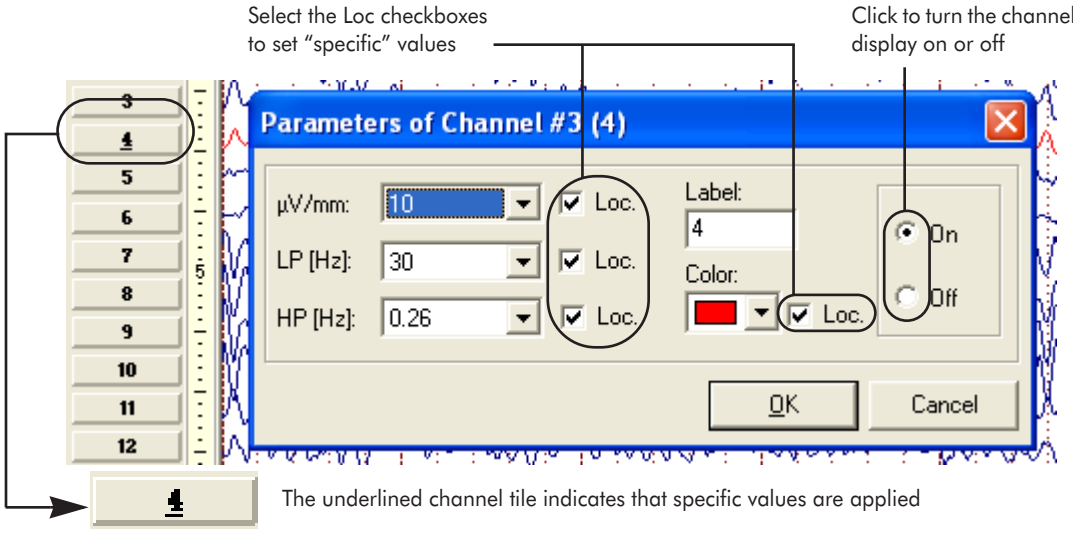


Figure 4-13. Channel parameters

After you specify local values and click OK in the parameters dialog, the channel tile label is underlined, to indicate that specific values have been applied.

Signal Buttons

In the middle of the Acquisition control panel is a group of buttons for checking the amplifier-signal quality before recording (Figure 4-14). There are three buttons: calibration signal, EEG signal, and interrupt signal.

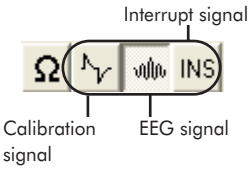


Figure 4-14. Signal buttons

- *Calibration signal*: This button applies the calibration signal to each channel, allowing you to view the effect of each channel's filter and sensitivity settings on a test signal. The calibration signal is a 0.5-Hz square wave that is visible when the highpass and lowpass filters are set to DC.

  First, initiate acquisition by clicking the Acquisition toggle; second, click the calibration signal button (Figure 4-15).

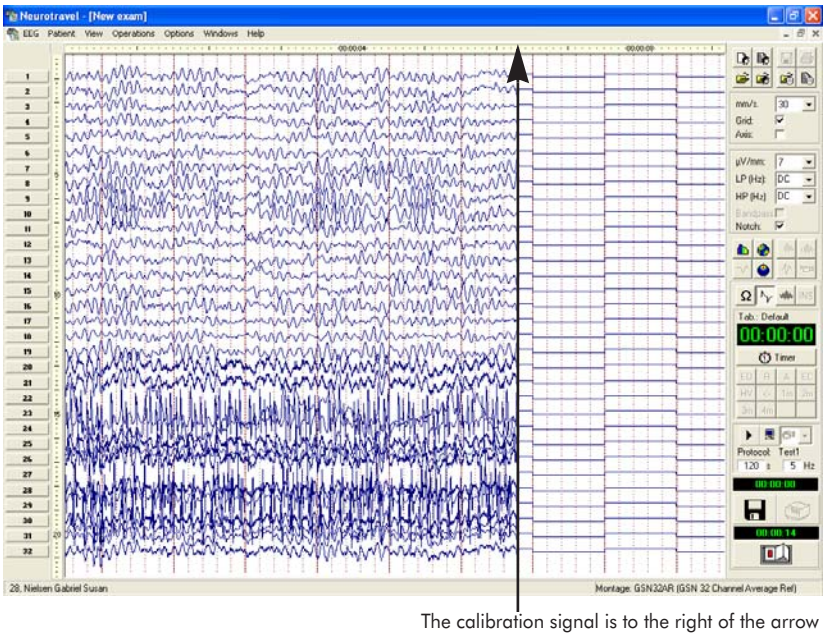


Figure 4-15. The calibration signal

To view or change the amplitude of the calibration signal, choose **Options > Acquisition > Parameters** (Figure 4-16). For more information, see "Data Acquisition Configuration" on page 189.

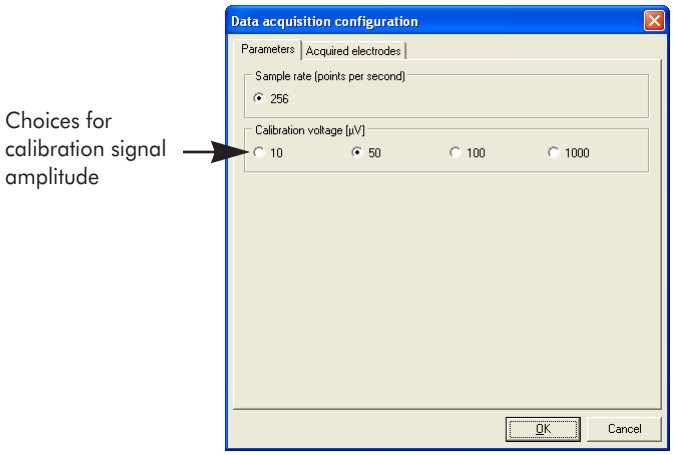


Figure 4-16. Setting the calibration signal

- *EEG signal*: This button displays the acquisition waveform for each channel. If this button is selected and the Acquisition toggle is clicked, the real EEG signal will be displayed.

  This button is selected by default; typically, the only time you need to click this button is after applying either the calibration signal or the interrupt signal (INS; described next).

- *Interrupt signal (INS)*: This button interrupts the connection between the electrodes and the amplifier without stopping data acquisition, thus grounding every channel. Use this button to bring the filters to zero or to stop the signal display (Figure 4-17). It is a toggle, allowing you to stop and resume signal display easily.

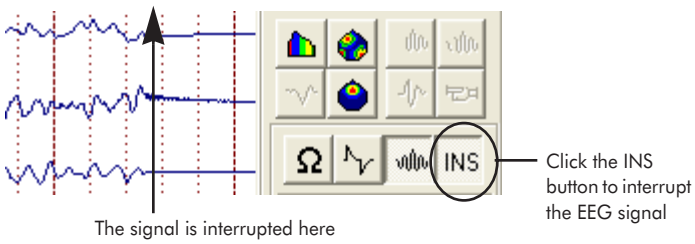


Figure 4-17. Interrupting the signal

Impedance Button

To the left of the signal buttons is the impedance button (Figure 4-18), which is designed to measure the impedance of the electrodes, before and during EEG recording. The impedance-measurement feature allows you to confirm that the electrodes are making good contact with the scalp; the numerical values are not saved to the file because they are not used in analysis.

Figure 4-18. Impedance button

Click the impedance button to open the Test Electrodes window, which consists of the Test and Parameters panes.

The Test pane (Figure 4-19) displays all the electrodes with their impedance measurements indicated by color: cool colors such as blue represent low impedances, and hot colors such as red indicate high impedances. Gray symbolizes impedances greater than 100 kΩ.

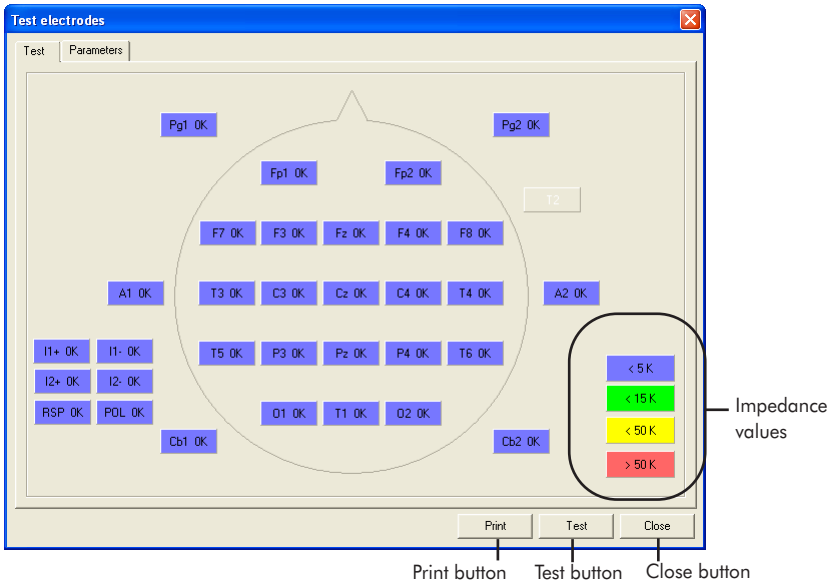


Figure 4-19. Test pane of the Test Electrodes window

When you measure the electrode impedances during an EEG exam, the recording stops and resumes when you close the Test Electrodes window.

Regarding the other buttons in the Test Electrodes window:

- Click the Print button, to print the window.
- Click the Test button, to measure the impedances again.
- Click the Close button, to dismiss the window.

To change the measurement values, click the Parameters tab in the Test Electrodes window. Two preset color schemes are offered: Default and EGI Net (Figure 4-20). You can also enter numeric values in the text boxes in the Levels section of the pane, to create a new color scheme.

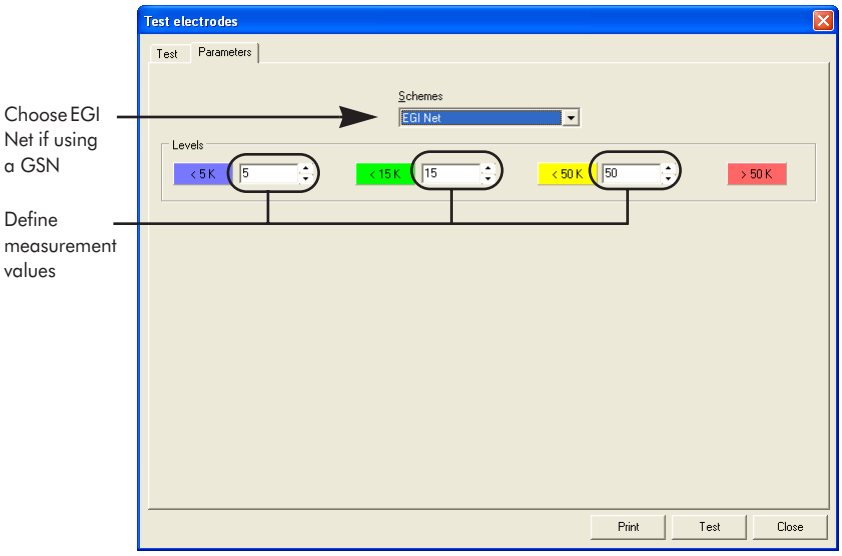


Figure 4-20. Parameters pane of the Test Electrodes window

The values for the preset color schemes are:

- *Default*: blue < 5k, green < 10k, yellow < 20k, and red > 20k
- *EGI Net*: blue < 5k, green < 15k, yellow < 50k, and red > 50k

Event Table Section

Below the impedance and signal buttons is the event table section (Figure 4-21), which enables you to insert events (from an *event table*, which is described in the following paragraphs) in the trace area while *recording* EEG (Figure 4-22); you cannot insert events if you are only *acquiring* EEG signals.

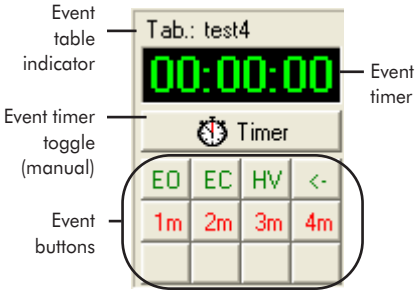


Figure 4-21. Event table section

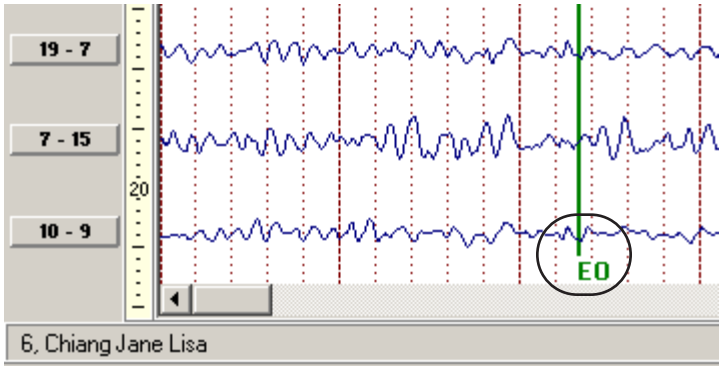


Figure 4-22. An "eyes open" event inserted in the trace using the EO button in the event table section

The event table section in the control panel displays buttons for as many as 12 different event types, each linked to its own mnemonic code. You can color-code events to make them easier to identify in the trace area. To apply colors, choose **Options > Display** and click the Markers tab. For more information, see "Markers Pane" on page 183.

Defining Events in the Event Table Dialog

An *event table* is a defined set of events; events are defined by their two-letter names, expanded descriptions (called "comments"), and their timer settings (these are described on page 85).

You define events in the Event Table dialog, which you open by choosing **Options > Event** and selecting New or Edit Current from the resulting pop-up menu (Figure 4-23).

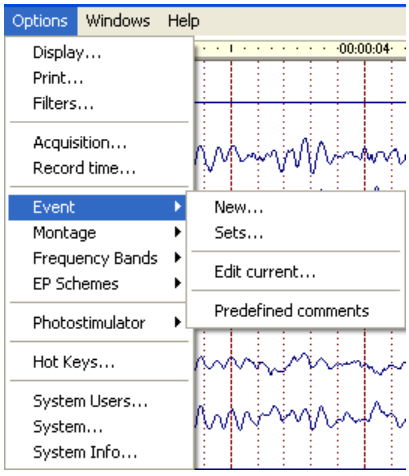


Figure 4-23. The Event menu command

If you want to edit an existing event table, select Sets from the pop-up menu to view a list of defined event tables, right-click on the desired table name, and choose Edit from the resulting pop-up menu; the Event Table dialog appears (Figure 4-24).

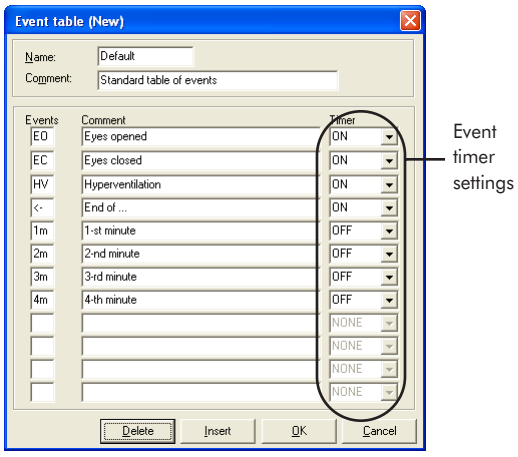


Figure 4-24. Event Table dialog

In the Event Table dialog, define the events by filling in the Name and Comment text boxes and by typing in the desired definitions in the Events, Comment, and Timer columns.

The Timer column displays three options for each event: on, off, or none.

- If an event has the timer "on," each time that event is inserted into the trace, it resets the timer to 00:00.
- If the timer is "off," it stops the timer.
- If the timer is "none," it has no effect.

The event-timer settings, if properly configured, can help you monitor the times between significant events. For example, if a critical event's timer is "on," and no "off" event occurs afterward, then the event timer will display the time elapsed since the last clinically important event. Furthermore, if no "none" event occurs, the software automatically inserts markers every minute into the trace and into the Event List, to help you keep track of the time elapsed. (Choose **View > Event List** to open this window. You can double-click on an event name in the list to navigate automatically to its event marker in the trace.)

Once satisfied, close the Event Table dialog.

Selecting an Event Table for Recording

Before initiating an EEG exam:

1. Choose **Options > Event > Sets** to open the Event Sets dialog, select an event table from the displayed list, and click the OK button in the dialog.

2. Click the Acquisition toggle in the Acquisition control panel, to begin acquiring EEG signals.

3. Click the Record toggle in the Acquisition control panel, to make the event buttons in the event table section active.

4. Insert events into the trace area, as they occur during the exam (notice that the timer above the event table section indicates the time between events, as defined for that event in the Event Table dialog).

You cannot change the selected event table, once you begin recording. To change the event table, you must stop the recording, select the desired event table, and create a new recording.

If an event occurs in the trace that is not defined in the Event Table dialog, you can mark the events on-the-fly using event comments. Just click in the trace area where the event occurs, to open the Event Comment dialog (Figure 4-25). Enter the comment, and click Close.

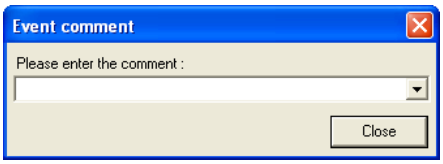


Figure 4-25. Event Comment dialog

For step-by-step instructions regarding creating, editing, or deleting event tables, see "Event Command" on page 194.

Photostimulator Controls

Below the event table section are a group of controls that enable you to specify and check the performance of the photostimulator connected to the EEG system.

- Click the mode toggle to select manual or automatic operation.
  - In manual mode (indicated by the "hand" button; Figure 4-26, left), select how often the photostimulator flashes by entering a value in the Frequency text box.
  - In the automatic mode (indicated by the "monitor" button; Figure 4-26, right), the photostimulator operation follows a predefined protocol. In this mode, instead of the frequency selector, the control panel contains indicators for the automatic protocol name, session duration, and flash frequency.

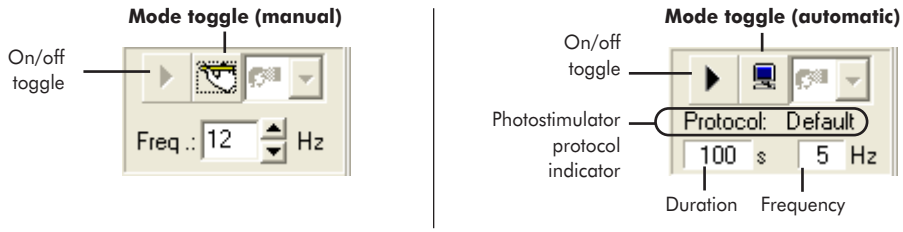


Figure 4-26. Photostimulator controls in its two modes: manual (left) and automatic (right)

- Click the "on/off" toggle (the arrow button on the far left) to start the photostimulator in either manual or automatic mode. Click it again to stop the device.

For information about creating, selecting, and editing automatic photostimulation protocols, see "Photostimulator Command" on page 208.

Automatic-Calculation Buttons

In the upper-middle of the Acquisition control panel is a group of toggle buttons related to visualization of automatic-calculation features such as spectral brain maps, channel spectrum, and coherence spectra (Figure 4-27). These features are useful for real-time monitoring of critical patients, such as those in intensive care units.

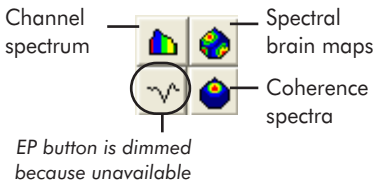


Figure 4-27. Automatic-calculation buttons

Spectral Brain-Maps Button

This button ("multicolored scalp") provides access to the spectral brain-mapping features. For more information, see "Spectral Brain Mapping" on page 130.

Channel-Spectrum Button

This button ("multicolored graph") provides access to the channel-spectrum features. For more information, see "Channel Spectrum" on page 138.

Coherence-Spectra Button

This button ("highlighted scalp") provides access to the spectral coherence features for a channel pair. For more information, see "Coherence Spectra" on page 146.

VideoEEG Button

To the right of the automatic-calculation controls is a “camera” button (Figure 4-28) that provides access to the optional VideoEEG feature, used during acquisition. For more information, see Chapter 10, "VideoEEG Kit Option.”

Figure 4-28. VideoEEG button

Record Toggle and Exam Recording

The Record toggle (Figure 4-29), above the Acquisition toggle, enables you to record an exam to disk after initiating the acquisition phase. The recorded data can be saved to an existing patient in the Patient List (see “Selecting a Patient Record” on page 169) or to a new patient at the end of the recording (see “Inserting a New Patient Record” on page 168).

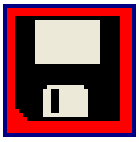


Figure 4-29. Record toggle

Click the Record toggle to begin recording; click again to interrupt the recording; click once more to resume recording. The recorded sections are saved to the same file, with recording breaks indicated by markers in the trace area and by events in the Event List dialog (open by right-clicking in the trace area and choosing Event List from the resulting pop-up menu; see Figure 4-30).

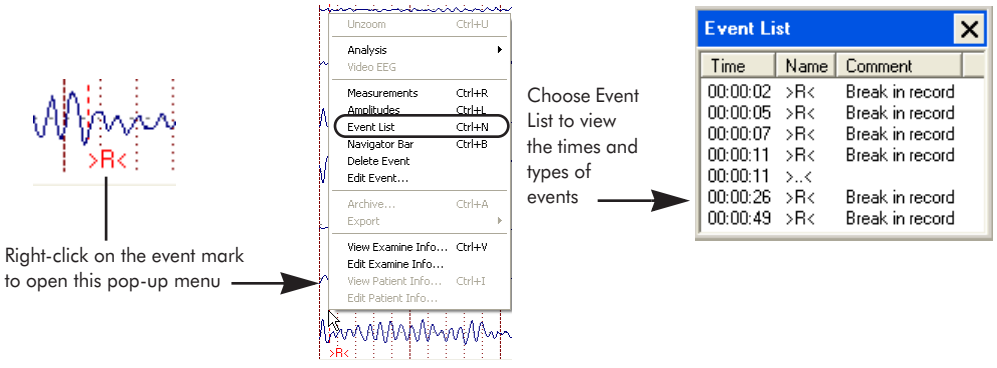


Figure 4-30. Break in the recording

A recording can end because the selected time is over, or a manual interruption has occurred. To end an exam manually, click the Acquisition toggle.

When the Acquisition toggle is off, the Review control panel automatically replaces the Acquisition control panel. (The Review control panel is discussed in Chapter 5.) The recording duration is set by choosing **Options > Record Time** (Figure 4-31; for more information, see "Record Time" on page 193).

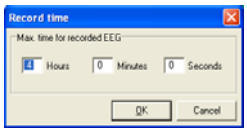


Figure 4-31. Recording time, maximum

Session Timers

The Acquisition control panel contains timers for the acquisition and recording modes (Figure 4-32).

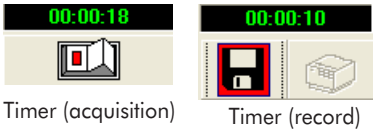


Figure 4-32. Acquisition and Recording timers

The Acquisition timer, immediately above the Acquisition toggle, displays the time elapsed for the acquisition session in hours:minutes:seconds.

The Recording timer, immediately above the Record toggle, displays the time elapsed for the recording session, also in hours:minutes:seconds.

Save Button

At the end of a recording session, the Save button (Figure 4-33), near the top-right of the panel, becomes active. This button saves the current exam to the person listed in the patient status bar (bottom-left corner of window; see Figure 4-34). The saved exam is automatically added to the Exams List.

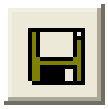


Figure 4-33. Save button

If the patient name to the current exam does not correspond to the patient status bar, click the Patient List button to select the correct patient; then click the Save button (otherwise, you will save the exam to the wrong patient).

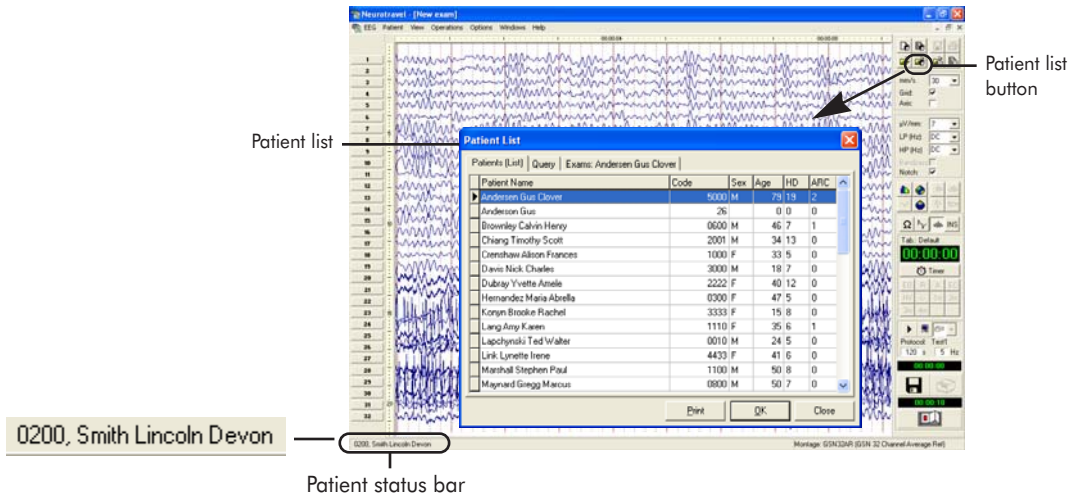


Figure 4-34. The patient name in the patient status bar

If the patient name is not in the Patient List, create a new record by right-clicking in the Patient List and choosing New Patient in the resulting pop-up menu; once finished creating a new-patient record, double-click on the new patient in the Patient List and click the Save button.

If you do not save the exam before initiating another acquisition session, a reminder message appears (Figure 4-35).

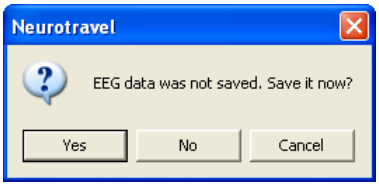


Figure 4-35. Save prompt

chapter 5

Review and Processing

The review mode enables you to view, edit, or print exams recorded to the hard disk; generate reports of the recorded exams; archive the exams to other storage media; or view or print any archived exam.

Neurotravel offers three review options:

- *Current patient review*: Enables you to review recorded and archived exams of the current patient (see "Selecting a Patient Record" on page 169). With this option, you can also create reports of the recorded exams.
- *Hard-disk review*: Enables you to review and archive exams that are saved to the hard disk.
- *Archive review*: Enables you to review exams that are archived on the E drive.

To initiate the review mode, choose one of these commands from the EEG menu (Figure 5-1):

- *Current Patient List*: Displays all the current patient's recorded *and* archived exams; corresponds to the current patient review.
- *List*: Displays all *recorded* exams of all patients; corresponds to the hard-disk review.
- *Archive List*: Displays all *archived* exams on the E drive of all patients; corresponds to the archive review.

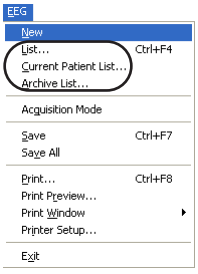


Figure 5-1. EEG review commands

In review mode, the Review control panel is displayed at the far right (Figure 5-2) or at the top of the window.

An exam recorded by Neurotravel Win can be displayed as a standard EEG recording trace. The Review control panel contains all the necessary controls to scroll backward and forward, turn "pages," and move quickly from top to bottom. Moreover, the Review control panel allows you to search for events inserted during the recording mode, and to zoom in on details of interest.

This chapter describes the three review options, Review control panel, event table section, zoom feature, Measurements palette, and Review Print button, as well as how to save selections of data.

(For a brief list of review procedures, see "Example EEG Viewing/Archiving" on page 240.)

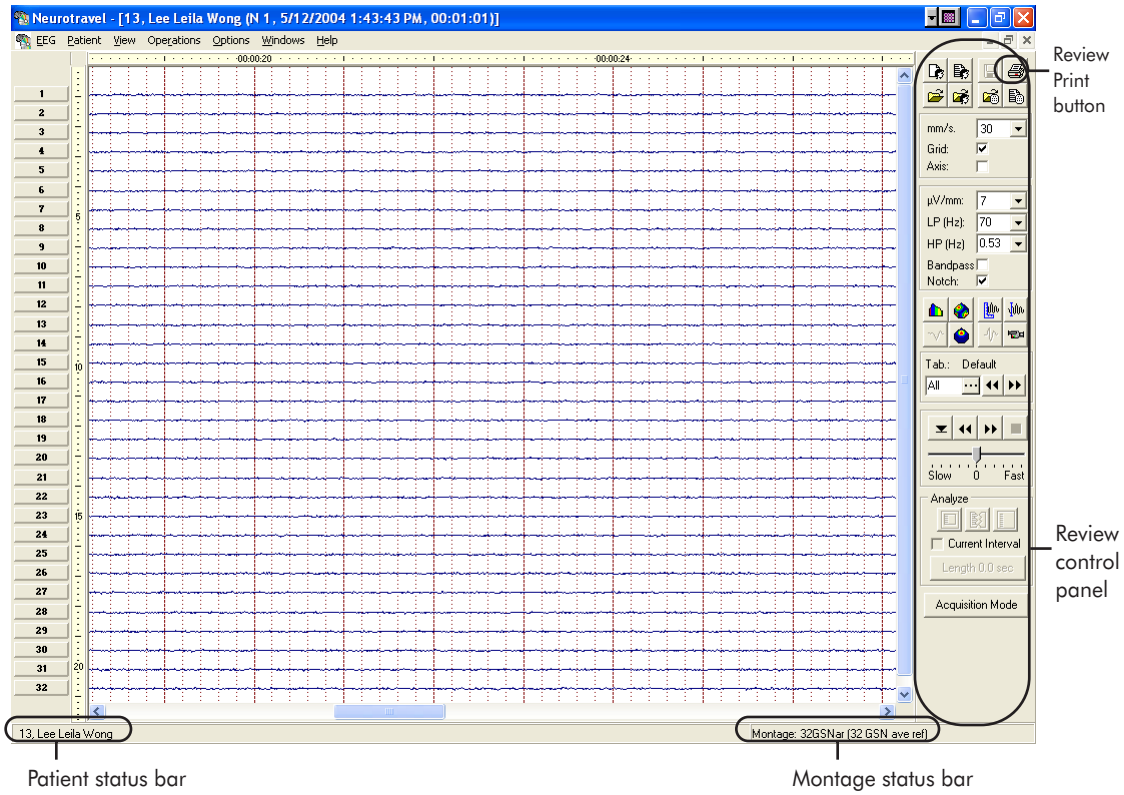


Figure 5-2. Control panel in review mode

*Note: Choose **Options > Acquisition** to open the Data Acquisition Configuration window for the recorded data (Figure 5-3). If a channel is not selected in the Acquired Electrodes pane, its data will not be available for review.*

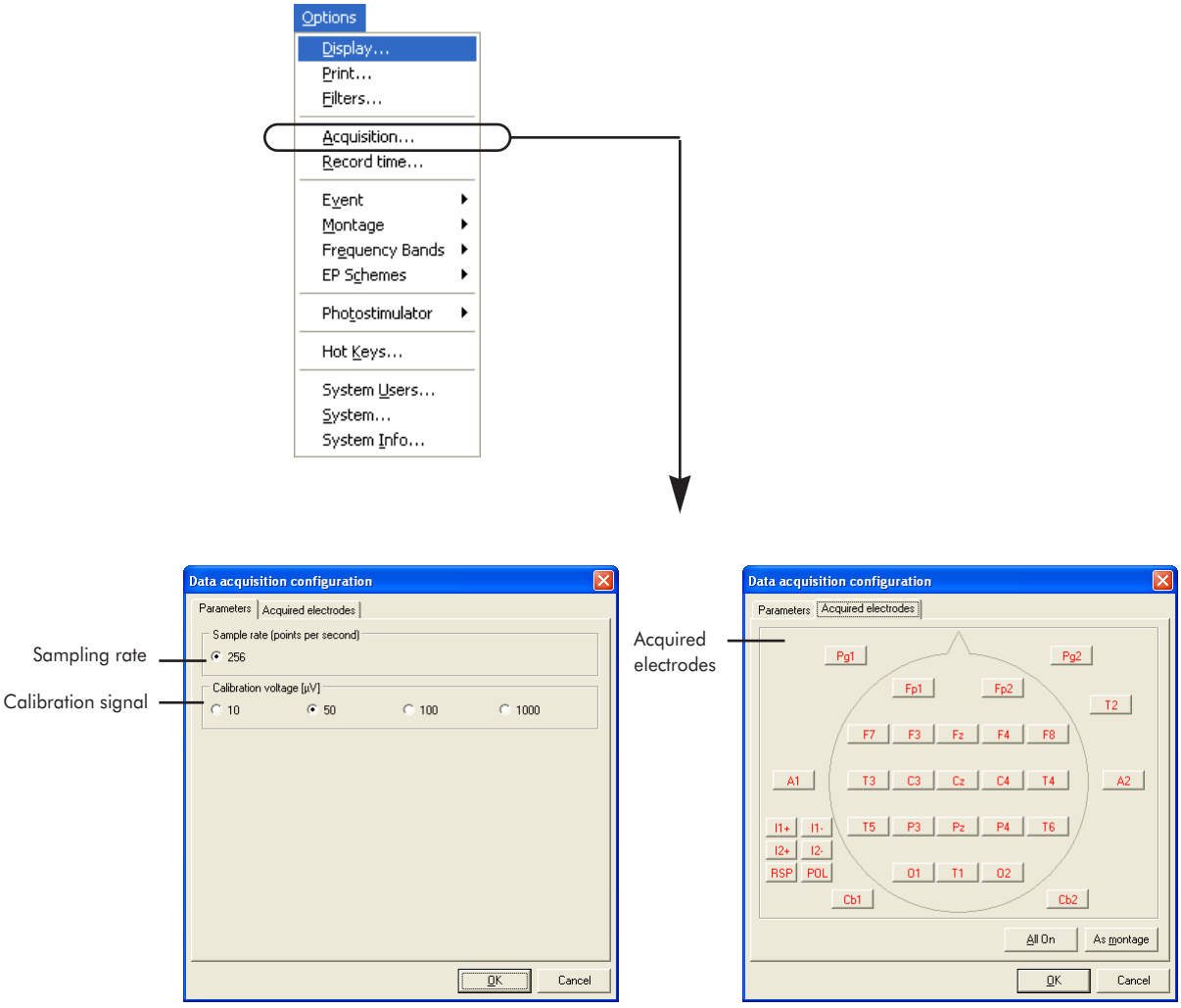


Figure 5-3. Check the acquisition parameters by choosing **Options > Acquisition**

Current Patient Review

This option enables you to review recorded and archived exams of the current patient (see "Selecting a Patient Record" on page 169). You can create, view, edit, or delete exam information in this mode. You can also generate reports of the recorded exams.

Choose **EEG > Current Patient List** to open the Current Patient Exam List dialog, which consists of the Exams (List) and Query panes (Figure 5-4). (If the patient status bar displays "No Patient," the **EEG > Current Patient List** option is unavailable.)

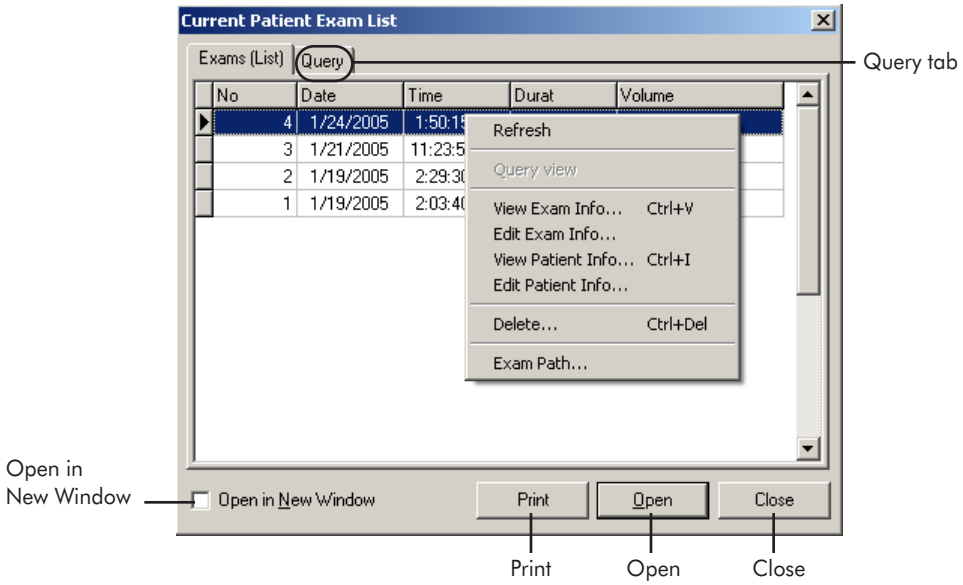
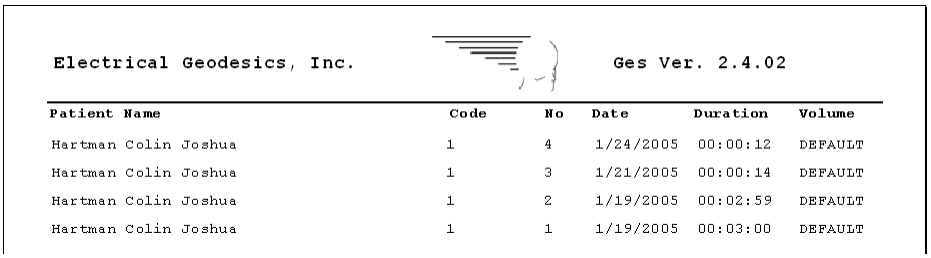


Figure 5-4. Current Patient Exam List

Exams (List) Pane

The Exams (List) pane contains the following controls:

- *Print button*: Prints the current patient's exam list, showing the patient's name, exam number, date, duration, and storage volume (Figure 5-5).



Electrical Geodesics, Inc. Ges Ver. 2.4.02

Patient Name	Code	No	Date	Duration	Volume
Hartman Colin Joshua	1	4	1/24/2005	00:00:12	DEFAULT
Hartman Colin Joshua	1	3	1/21/2005	00:00:14	DEFAULT
Hartman Colin Joshua	1	2	1/19/2005	00:02:59	DEFAULT
Hartman Colin Joshua	1	1	1/19/2005	00:03:00	DEFAULT

Figure 5-5. Section of printout of current patient's exam list

- *Open button*: Opens the selected exam (exam #4 is selected in Figure 5-4), replacing the currently displayed exam. (Select multiple exams by Control-clicking on the exams in the list.)
- *Open in New Window checkbox*: Opens the selected exam in a separate window so it does *not* replace the currently displayed exam. First, select this checkbox, select the exam, and then click the Open button. (Select multiple exams by Control-clicking on the exams in the list.)
- *Close button*: Dismisses the window.

You can enter and edit exam information by right-clicking on the exam name in the list, to open a pop-up menu that contains the New Exam Info and Edit Exam Info commands (see Figure 5-4).

Query Pane

The Query pane allows you to perform a search, by recording date, of the exams recorded for the current patient. In the Query pane, type the dates in the "Exams from" and "to" text boxes, and click the Search button (Figure 5-6).

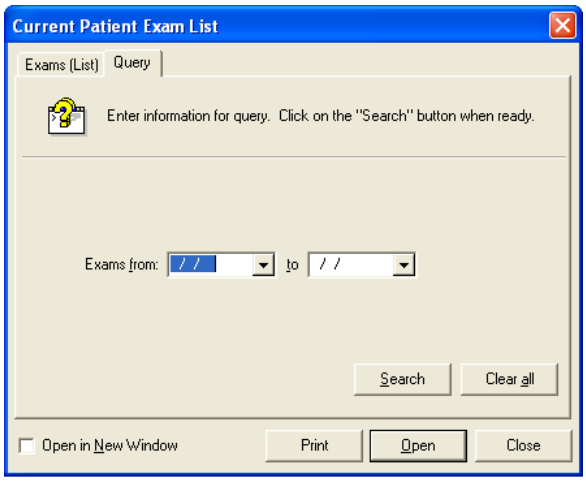


Figure 5-6. Query pane

The Exams (Query) pane then replaces the Exams (List) pane and displays the search results, listing the exams by date and time (Figure 5-7).

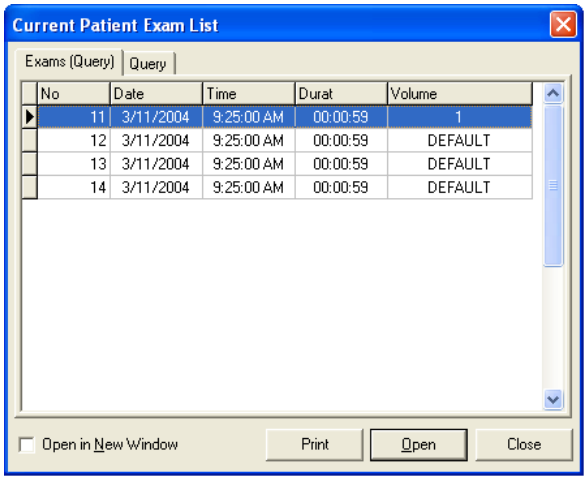


Figure 5-7. Exams (Query) pane

For each exam, the following information is provided: exam number for the patient, date and time of the recording, exam duration, and volume number where the exam is recorded or archived.

Enter and edit exam information by right-clicking on the exam name in the list, to open a pop-up menu that contains the Edit Exam Info command (similar to the menu shown in Figure 5-4).

If no exams are found by the search, the Exams (Query) pane is displayed, but with no exams listed.

Hard-Disk Review

This review option enables you to review and archive exams that are saved to the hard disk. You can also create and edit exam information in this mode.

Choose **EEG > List** to open the Exams List dialog, which consists of the Exams (List) and Query panes (Figure 5-8).

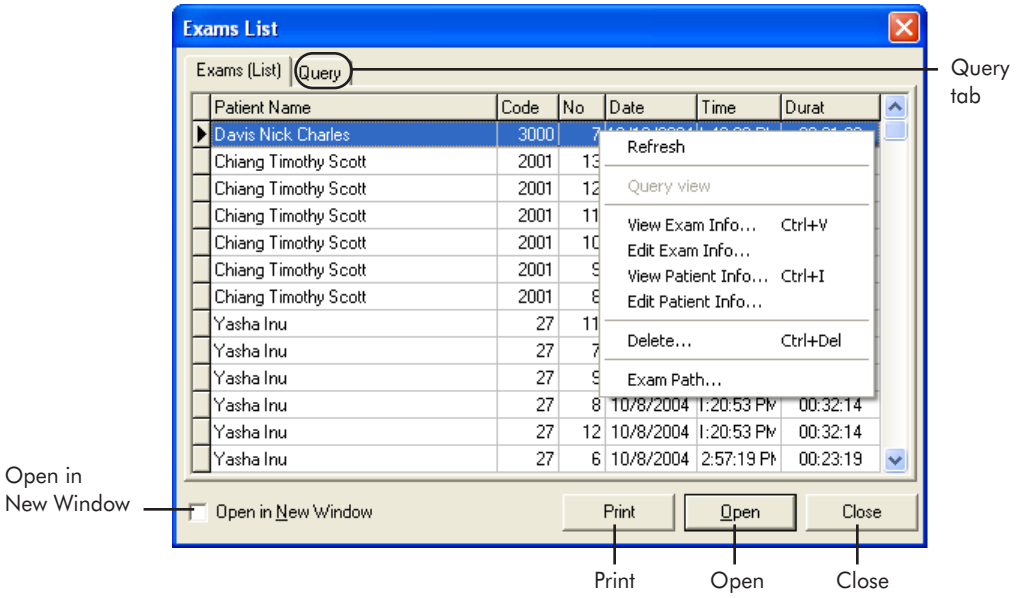


Figure 5-8. Exams List

*Note: When an exam is recorded with the VideoEEG option, it is marked with an asterisk (*) in the Patient Number field when you choose either **EEG > List** or **EEG > Archive List**. For more information about the VideoEEG option, see Chapter 10.*

For information about the Exams (List) and Query panes, see page 95 and page 96, respectively.

Archive Review

This review option enables you to review exams that are archived on the E drive. You can only view exam information in this mode; no editing is allowed.

Choose **EEG > Archive List** to open the Archive Exams List dialog (Figure 5-9).

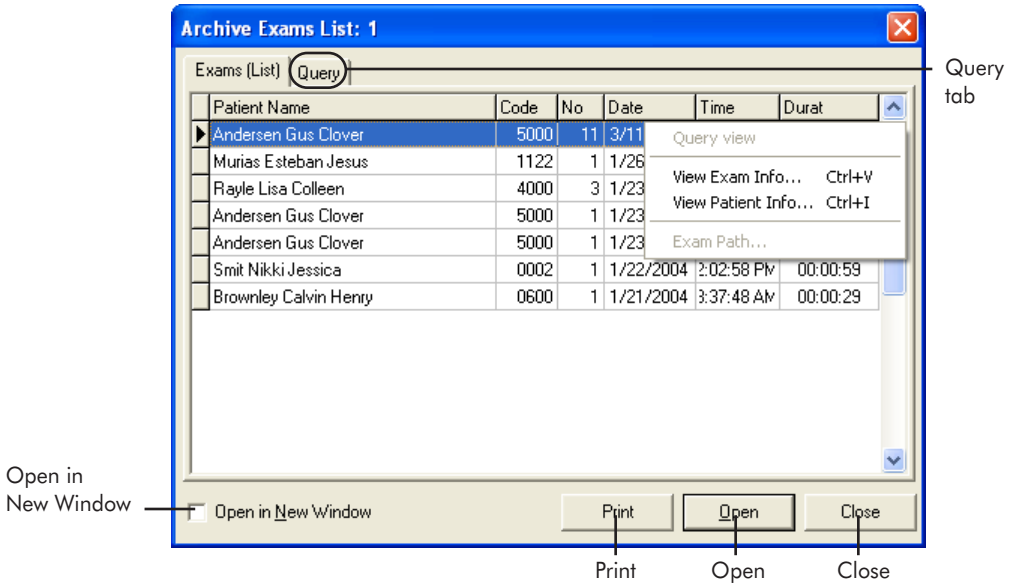


Figure 5-9. Archive Exams List

*Note: When an exam is recorded with the VideoEEG option, it is marked with an asterisk (*) in the Patient Number field when you choose either **EEG > Archive List** or **EEG > List**. For more information about the VideoEEG option, see Chapter 10.*

For information about the Exams (List) and Query panes, see page 95 and page 96, respectively.

Review Control Panel

The Review control panel (Figure 5-10) contains all the commands needed to review, archive, and generate a report from an exam. These include controls for navigation, events, zoom, filters, grids, review speed, optional features, saving, automatic calculations, and printing. Each is briefly described.

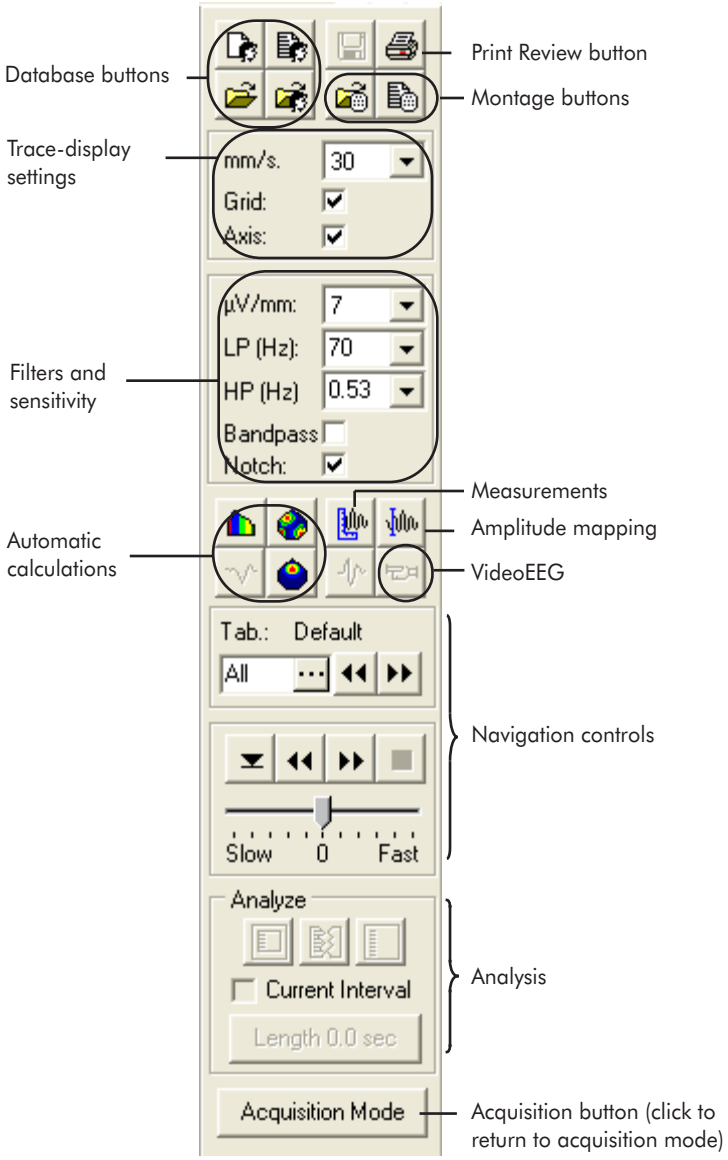


Figure 5-10. Review control panel

Figure 5-10 shows the Review control panel in its default, vertical position.

(You can also display the panel horizontally, by choosing **Options > System > View** and selecting the Horizontal Control Panel checkbox. However, the horizontal version contains fewer controls than the vertical version; for more information, see "System Configuration Window" on page 215.)

Database Buttons

At the top left of the Review control panel are buttons to access information from the database quickly (Figure 5-11). During routine operation, you use these buttons to review and edit exams.

The four database buttons allow you to create a record for a new patient, edit the current patient data record, open the list of recorded exams, and open the list of patients. (See Chapter 8, "Patient Menu," for more information.)

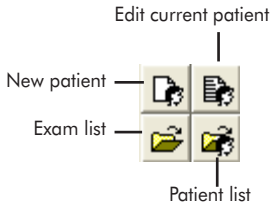


Figure 5-11. Database buttons

Navigation Controls

Near the bottom of the Review control panel are the navigation controls (Figure 5-12). These controls consist of a slider and buttons that allow you to move through the data efficiently.

The top buttons allow you to navigate by *event type*; the bottom allow you to *scroll* through the file. Set the scrolling speed by dragging the slider to the left (slow) or to the right (fast).

*Note: If you prefer to "page" through the exam rather than scroll, choose **Options > Display**. Click the Parameters pane, and in the Auto scroll area, click the Pagewise option button.*

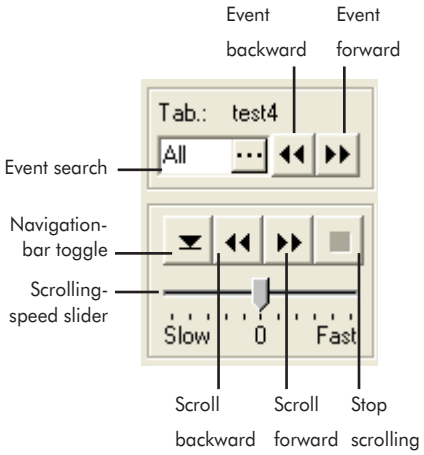


Figure 5-12. Navigation controls

Navigation-bar toggle

Navigation Bar

The leftmost button above the scrolling-speed slider is the navigation-bar toggle. Click it to open or hide the navigation bar (Figure 5-13).

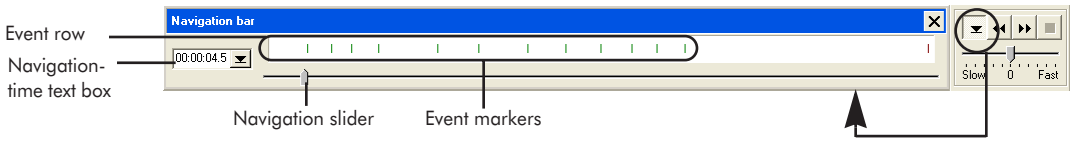


Figure 5-13. Navigation bar and toggle

The navigation bar consists of the navigation slider, event markers, event row, and navigation-time text box. Each is described briefly:

- *Navigation slider*: Allows you to navigate to a specific event in the trace by dragging it to the event marker.
- *Event markers*: Are vertical marks in the event row above the navigation slider (see Figure 5-13).

  If you have color-coded the events (by choosing **Options > Display** and coding them in the Markers pane), then the vertical marks in the event row are likewise colored.
- *Event row*: Allows you to navigate rapidly to an event by double-clicking on the desired spot in the row.
- *Navigation-time text box*: Allows you to navigate by time, by entering a value in the navigation-time text box (see Figure 5-13), which displays the timepoint of the slider. Press the Enter key.

Event-navigation buttons

Event-Search Buttons

The event-backward and event-forward buttons of the navigation controls enable you to search backward and forward for specific events. To specify the events, click the "dotted" browse button next to the event search box.

Event search controls

Clicking on the dotted browse button opens the Selection of an Event window, which lists *all* defined events from which you can choose (Figure 5-14).

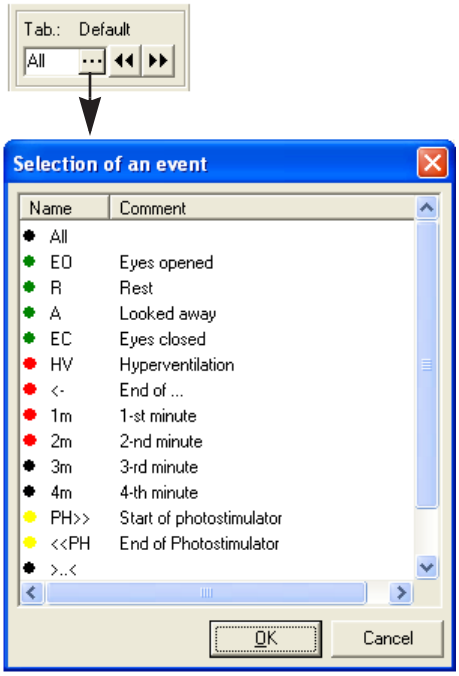


Figure 5-14. Selection of an Event window

When you choose an event, its name appears in the event search box (for example, EO) and you can use the event-backward and event-forward keys to navigate backward and forward, respectively, through the file to each such event.

To open a list of only the events that *occurred* in the current exam, right-click in the trace area and choose Event List from the resulting pop-up menu. For more information, see "Modifying Events" on page 110 and "Event Command" on page 194.

Trace-Display Settings

Near the top of the Review control panel are selectors for the trace-display settings (Figure 5-15) to review EEG data. The software displays the traces, from right to left. The trace-display buttons enable you to control the scrolling speed of the trace, and the use of vertical and horizontal guidelines.

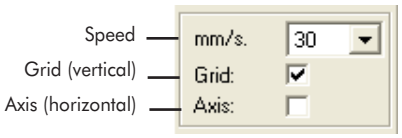


Figure 5-15. Trace-display settings

Use the top control to specify the scrolling speed of the traces displayed onscreen. Below the speed control are checkboxes for showing or hiding the guides in the trace area during scrolling. The Grid box refers to vertical guides, and the Axis box refers to horizontal guides that correspond to each channel.

(Choose **Options > Display** to view the vertical guide widths; Figure 5-16.)

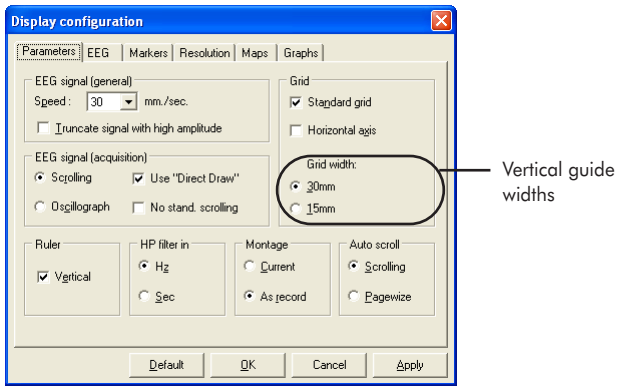


Figure 5-16. Display settings in the Options menu

Review Montage Buttons

To the right of the database buttons (Figure 5-17) are the two review montage buttons. These buttons enable you to review the data using different montages.

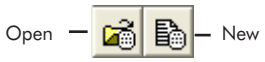


Figure 5-17. Montage buttons

- Click the “open” button to view a list of available montages. You can modify a montage by right-clicking on a montage name in the list, and choosing Edit from the resulting pop-up menu.
- Click the “new” button to create a new montage.

The review montage buttons affect the *display* of the data only. You can review data from only the electrodes that you chose to record; otherwise, a warning message appears and unrecorded channels are displayed as flat lines.

To discover which electrodes were recorded, choose **Options > Acquisition** and click the Acquired Electrodes tab (Figure 5-18). This pane shows you the acquisition electrodes that have been recorded: individually selected electrodes, all, or those in the montage. (For more information, see Chapter 9, "Options Menu.")

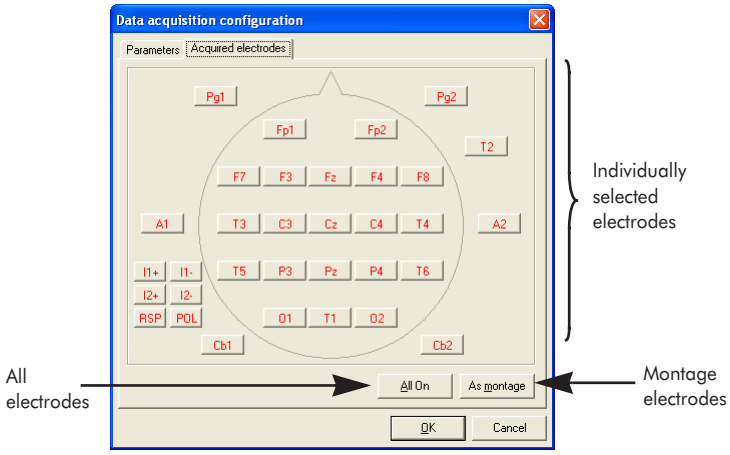


Figure 5-18. Acquisition montage settings

Filter Controls

In the upper-half of the Review control panel are the filters and sensitivity controls (Figure 5-19) for applying the notch filter, specifying lowpass and highpass filter values, and defining filter sensitivity. These controls affect the *appearance* of the data onscreen and in the printouts; they do not modify the actual *recorded* data.

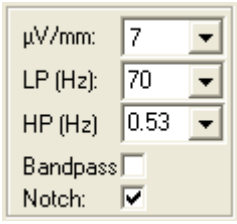


Figure 5-19. Filter controls

Notch Checkbox

The notch checkbox (Figure 5-20) enables you to insert and remove a filter that attenuates frequencies in a narrow band around the specified frequency, while passing frequencies outside the band. The notch filter is used to filter out 50 or 60 Hz line noise (Figure 5-21). In Europe, 50 Hz is the main power-supply frequency; in North America and other countries, the frequency is 60 Hz. (Japan is mixed; some regions use 50 Hz, others use 60 Hz.)

Figure 5-20. Notch filter

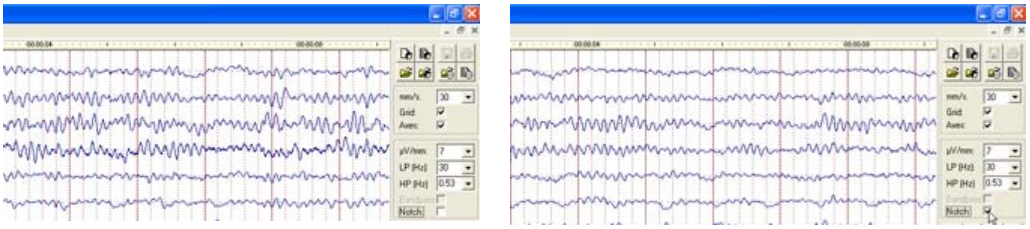


Figure 5-21. Notch filter, off (left) and on (right)

To view the notch filter setting, choose **Options > Filter** (Figure 5-22). For more information about setting the notch filter, see "Data Acquisition Configuration" on page 189.

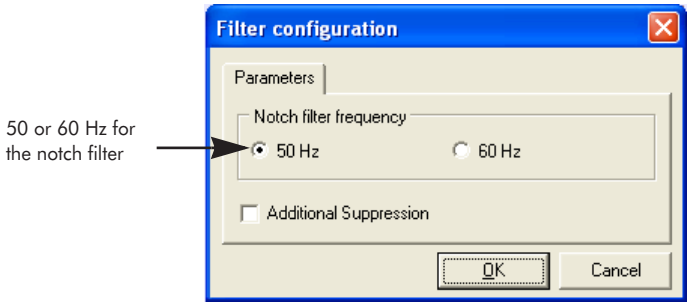


Figure 5-22. Select 50 or 60 Hz notch filter in the Filter Configuration window

Filter Selector Values

Above the notch checkbox is a group of selectors for specifying values for filter sensitivity, highpass filters, and lowpass filters for reviewing an EEG session (Figure 5-23).

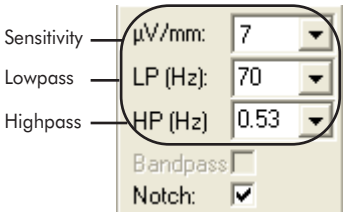


Figure 5-23. Filter selectors

The filter sensitivity selector opens a predefined list of values; you cannot define your own value by typing it into the text box. The lowpass and highpass filter selectors open predefined lists, but these text boxes can also accept user-defined values.

Global Values

The filter selectors allow you to apply "global" values, which means that they apply to all channels, unless otherwise specified. You can apply "specific" values to individual channels, which override the global values for those channels. In other words, *global* values do not affect any *specific* values defined for individual channels (which are described in the next section).

Specific Values

To define "specific" values for a channel, click on the channel tile (Figure 5-24), which opens the Parameters of Channel dialog (Figure 5-25).

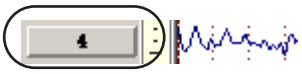


Figure 5-24. Channel tile

In the dialog, selecting a Loc checkbox allows you to define a "local" or specific value for filter sensitivity, highpass filter, lowpass filter, or signal color. Deselecting the Loc checkbox returns the filter or color setting to the global value.

The On and Off option buttons in the dialog enable you to turn "on" or "off" the signal display (an "off" channel is represented by a flat line).

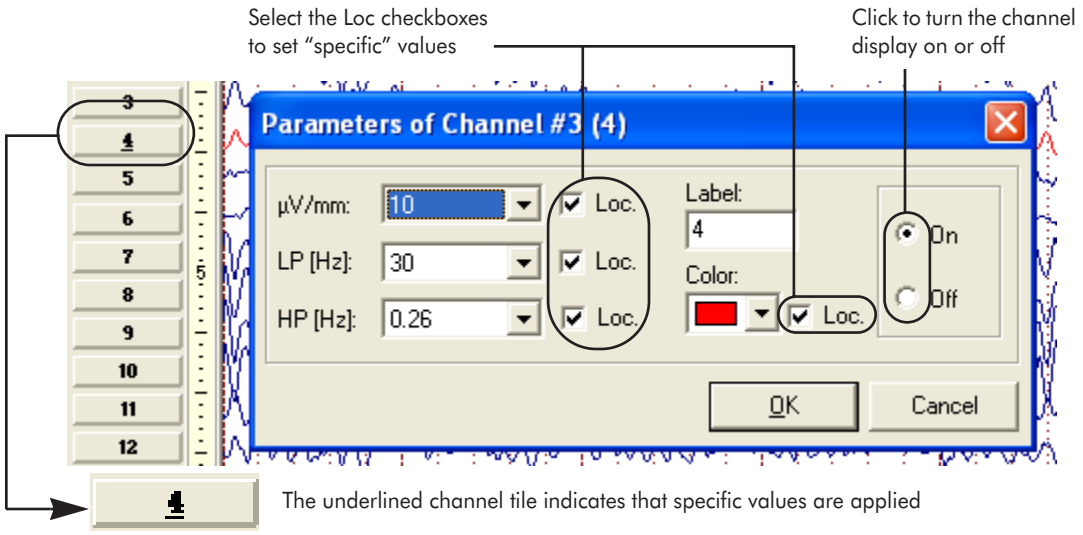


Figure 5-25. Channel parameters

After you specify local values and click OK in the parameters dialog, the channel tile label is underlined, to indicate that specific values have been applied.

Automatic-Calculation Buttons

Near the center of the Review control panel is a group of buttons related to the visualization of automatic calculations such as spectral brain maps, channel spectrum, and coherence spectra (Figure 5-26).

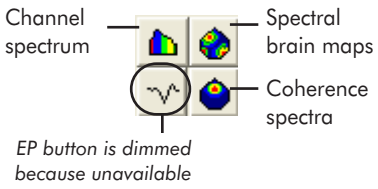


Figure 5-26. Automatic-calculation buttons

Spectral Brain-Maps Button

This button ("multicolored scalp") provides access to the spectral brain-mapping features. For more information, see "Spectral Brain Mapping" on page 130.

Channel-Spectrum Button

This button ("multicolored graph") provides access to the channel-spectrum features. For more information, see "Channel Spectrum" on page 138.

Coherence Spectra Button

This button ("highlighted scalp") provides access to the spectral coherence features for a channel pair. For more information, see "Coherence Spectra" on page 146.

Analysis Buttons

At the bottom of the Review control panel are the analysis controls (Figure 5-27). These buttons enable you to apply the automatic-calculation functions of spectral brain mapping, channel spectrum, and coherence spectra to specific *epochs of data*, as well as to the entire exam. For more information, see "Analyzing Selected Data" on page 117.

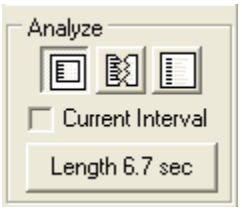


Figure 5-27. Analysis controls

VideoEEG Button

To the right of the automatic-calculation controls is a “camera” button (Figure 5-28) that provides access to the optional VideoEEG feature. For more information, see Chapter 10, "VideoEEG Kit Option.”

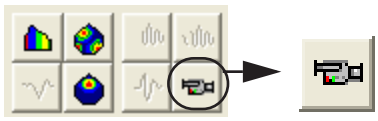


Figure 5-28. VideoEEG button

Measurements Button

To the right of the automatic-calculation controls is a “T-square” button (Figure 5-29) that opens the Measurements palette, for calculating the time and space of selected portions of a trace. For more information, see “Measuring Trace Portions” on page 112.

Figure 5-29. Measurements button

Amplitude-Mapping Button

To the right of the automatic-calculation controls is a “wavy” button (Figure 5-30) that provides access to the amplitude-mapping feature. Amplitude mapping is actually an automatic-calculation feature as well, but it differs from the other three—spectral brain maps, channel spectrum, and coherence spectra—in that it can be used only during the review mode. For more information, see “Amplitude Mapping” on page 123.

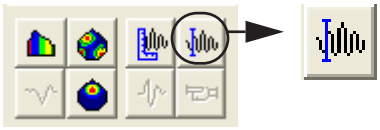


Figure 5-30. Amplitude-mapping button

Data Processing

In review mode, typical operations include modifying events, zooming in on details, measuring trace portions, saving data selections, and marking epochs.

Modifying Events

To open the Event List, which is a list of all the events in the trace and their times in the recording (Figure 5-31), you can:

- Choose **View > Event List**.
- Press Control-N.
- Or right-click in the trace area to open a pop-up menu with the Event List command.

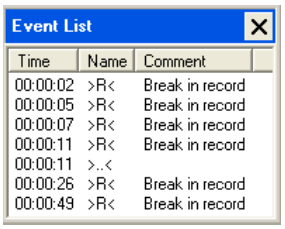


Figure 5-31. Event List window

You can use the Event List to navigate to a specific event. Double-click on an event in the list, and the window automatically navigates to that event marker in the trace.

To view an event label, move the cursor over the event marker in the trace and the label will appear (Figure 5-32).

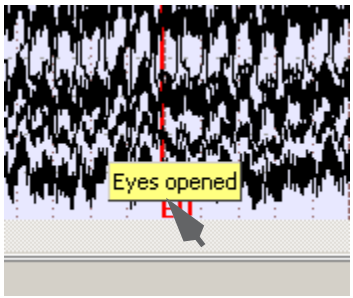


Figure 5-32. Pop-up text under the cursor

To add, edit, or delete an event, right-click in the trace (Figure 5-33):

- *Add*: Right-click at a timepoint ***without*** an event marker, choose Add Event from the resulting pop-up menu, and add the event in the Edit/Add Event dialog.
- *Edit*: Right-click at a timepoint ***with*** an event marker, choose Edit Event from the resulting pop-up menu, and edit the event in the Edit/Add Event dialog.

- *Delete*: Right-click at a timepoint ***with*** an event marker, and choose Delete Event from the resulting pop-up menu. ***No confirmation dialog appears, so use this command with care.***

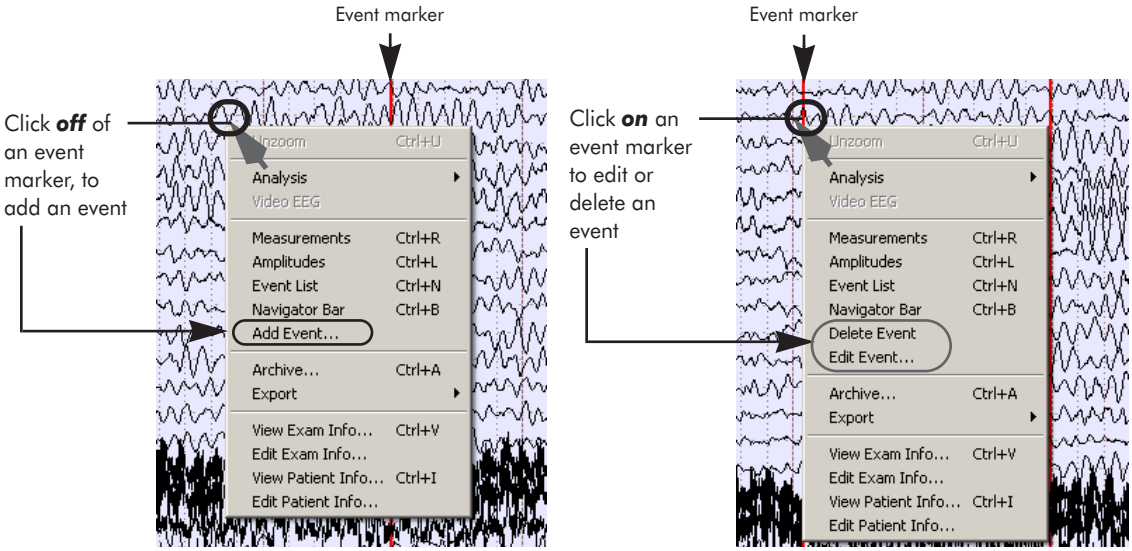


Figure 5-33. The pop-up menus differ, if you click ***off*** of (left) or ***on*** (right) an event marker

Any changes to the events in the trace automatically appear in the Event List.

Zooming in on Details

While reviewing a trace, you can zoom in on details by pressing the left mouse key while dragging the cursor over the area of interest and then releasing the key. The area under the cursor enlarges immediately and the Measurements palette opens (this is described in the following paragraphs).

The zoom feature does not work if:

- The Measurements palette is already open. Close the palette and drag again.
- You drag roughly in a straight line and do not include enough height in your selection. An *area* of the trace—comprising sufficient width and height—must be selected for enlargement.

To continue enlarging the zoomed-in region, close the Measurements palette and drag the cursor over the area of interest in the enlarged view.

To revert to the original display size, press Control-U, or right-click in the trace area and choose Unzoom from the resulting pop-up menu.

Measuring Trace Portions

The Measurements palette enables you to measure trace portions, in terms of time or width.

Measurements button

Open the palette by clicking and dragging in the trace area (which also zooms in on the area) or by clicking the Measurements button in the Review control panel. (You can also right-click in the trace area to open a pop-up menu containing the Measurements command and other options.)

To measure a portion of data, at the measurement starting point in the trace, press the left mouse key, drag to the desired point, and release the key. The Current column in the Measurements palette will display the frequency of the measured trace, directly calculated as the inverse of the time duration selected with the cursor (Figure 5-34).

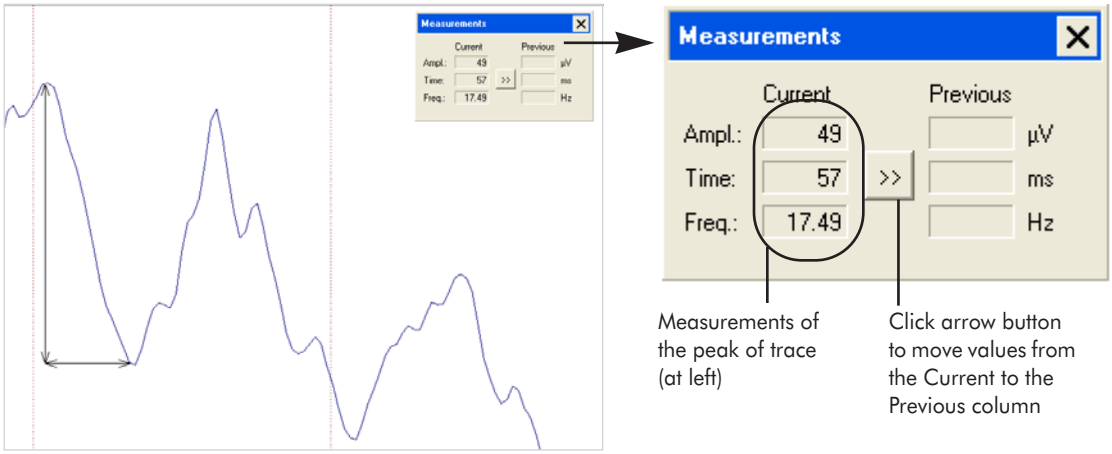


Figure 5-34. Measurements palette

To perform a second measurement for comparison with the first one, click the arrow button in the palette. This moves the values from the Current to the Previous column. Drag over a second area in the trace to highlight another portion. The values from that measurement now appear in the Current column (Figure 5-35).

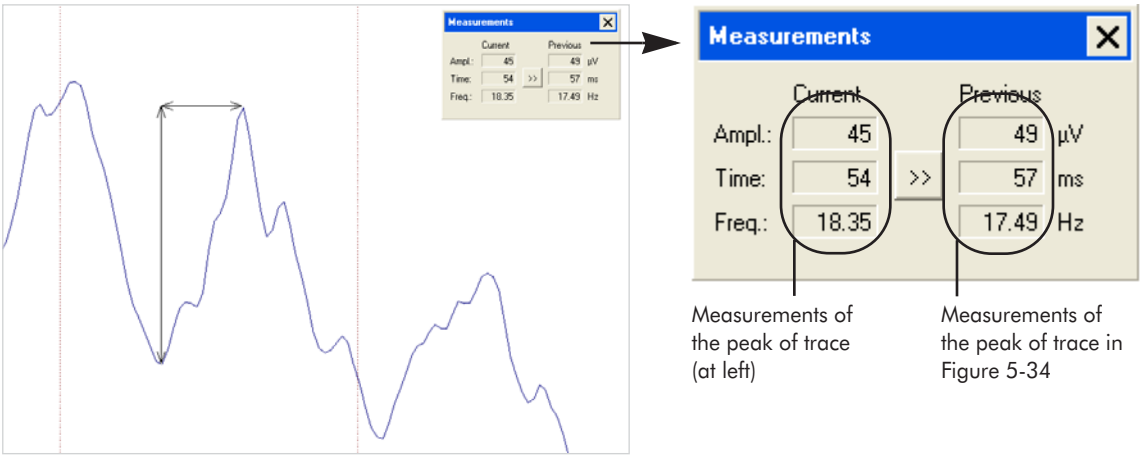


Figure 5-35. Comparing two measurements

Selecting Data

With Neurotravel Win, you can select data of interest and delete, mark up, or analyze the selection. Deleting selections, a feature available only in the review mode, can save valuable disk space and ensure that most of the data for analysis are relevant and "clean" (that is, contain little noise).

The navigation bar (see Figure 5-13 on page 101) is useful for finding events. Once the area of interest is onscreen, you can:

- *Select a small region*: Press the Shift key while dragging over the area of interest onscreen. The selection remains highlighted, even if you make another selection, allowing you to make multiple discontiguous selections.
- *Select a large area*:
  - Press the Control key and click once onscreen; this selects the entire region to the *right* of the click.
  - Or press the Alt key and click once onscreen; this selects the entire region to the *left* of the click.

Once an interval is highlighted, you can apply visualization tools to that selection (see "Analyzing Selected Data" on page 117 for more information).

To deselect data, double-click within the selection, or right-click in the selection to display a pop-up menu that contains the Unmark Interval command (Figure 5-36).

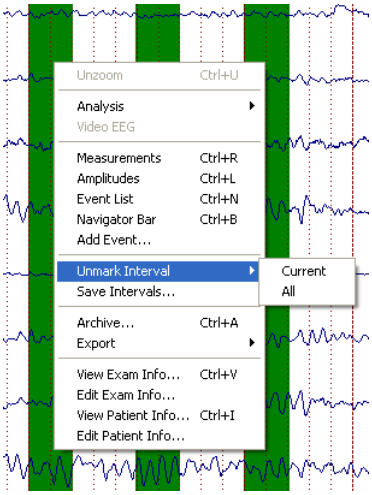


Figure 5-36. Unmarking selected intervals

Saving Data Intervals

Once the data are selected, you can *save the selections*. This process is called *saving intervals*, and it captures the highlighting action itself; it does ***not*** save the selected data to a separate file. Saving intervals enables you reapply the highlighting later, to spotlight sections of data of particular interest.

To save intervals, right-click in the trace area and choose Save Intervals (Figure 5-37). A pop-up window appears, allowing you to name the selected intervals with an identifying code that indicates their significance (for example, “spike”).

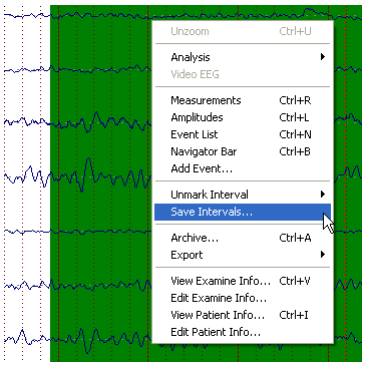


Figure 5-37. Choose to save a data selection

Once the intervals are saved, you can continue saving different data selections in that file, if desired.

To view a list of the file’s saved intervals, right-click in the trace area and choose Load Intervals from the resulting pop-up menu. The Select Saved Intervals window appears (Figure 5-38).

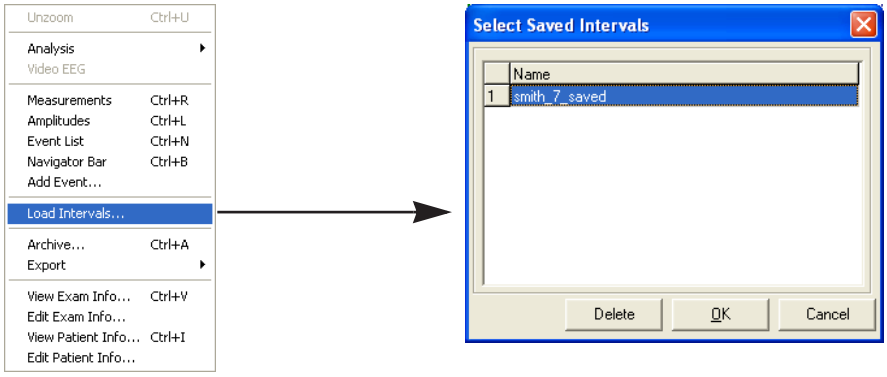


Figure 5-38. Choose Load Intervals to view the Select Saved Intervals window

In the Select Saved Intervals window, you can:

- Remove an interval from the saved list (by selecting it from the list and clicking the Delete button).
- Or view the saved intervals in the trace (by selecting it from the list and clicking the OK button, which highlights the intervals in the trace; Figure 5-39).

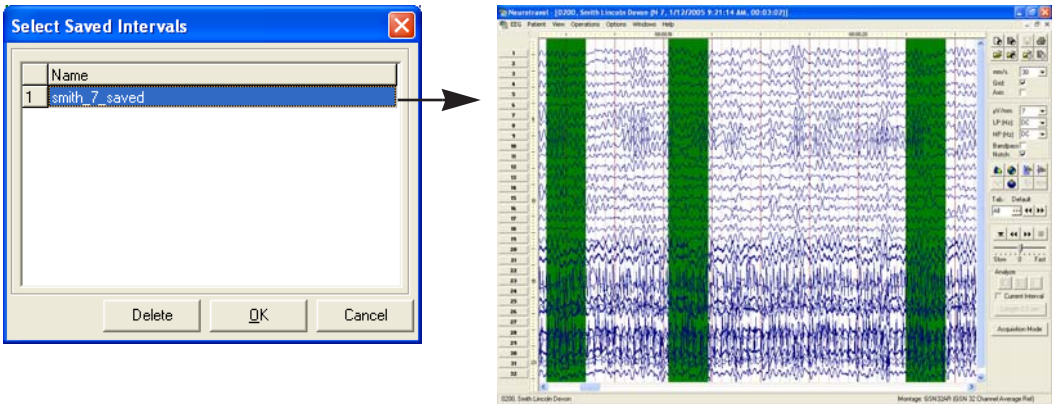


Figure 5-39. Choose an interval in the Select Saved Intervals window and click OK, to highlight all instances of it in the trace area

Deleting Data Sections

Saving or deleting intervals (as described in the preceding section) does ***not*** alter the recorded data.

You can, however, select data in the trace area and delete them, which is described in this section. ***This process does permanently alter the file, and is irreversible, so exercise caution.***

To delete a data section:

1. Highlight the data in the trace area using the Shift-drag, Alt-click, Control-click, or Select Saved Intervals methods just discussed (on pages 113–116).

2. Choose **Operations > Delete Signal Portion**.

When you delete data:

- A "break in record" mark (that is, an *event marker*) in the trace indicates the removal of data (Figure 5-40). This type of event marker is inserted into the trace whenever a section of data is removed.
- If you are using the optional VideoEEG feature, the video sequence related to the section is also removed.

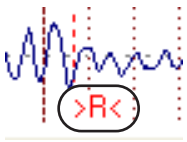


Figure 5-40. Break mark

Analyzing Selected Data

You can also apply the automatic-calculation tools to selected data or data intervals.

The analysis controls at the bottom of the Review control panel allow you to display brain maps, channel spectrum, or coherence spectra of the visible area onscreen, the marked intervals, or all the data in the exam (Figure 5-41). The "length" button indicates the duration of the data being analyzed.

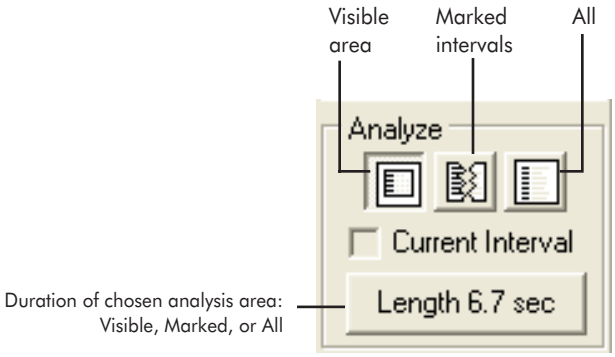


Figure 5-41. Analysis controls

1. Highlight the data in the trace area using the Shift-drag, Alt-click, Control-click, or Select Saved Intervals methods just discussed (on pages 113–116).

Automatic-calculation buttons

2. Click the spectral brain map, channel spectrum, or coherence spectra button in the Review control panel, or choose **View > Analysis**; either makes the analysis controls active in the control panel.

Marked intervals

Visible area

All

3 Use the analysis controls to apply the automatic-calculation tools, as follows:

- *To only the highlighted interval*: Click the "marked intervals" button (Figure 5-42). If more than one interval is highlighted, applying the visualization tool produces a "normalized" result for the selected intervals.
- *To the area visible onscreen*: Click the "visible area" button.
- *To the entire exam*: Click the "all" button.

You can cycle through the buttons, viewing the different maps or spectra when applied to the various intervals (marked, visible, all).

4 The "length" button automatically displays the time duration of the interval chosen for analysis (marked, visible, or all areas).

See Chapter 6 for descriptions of the automatic-calculation tools.

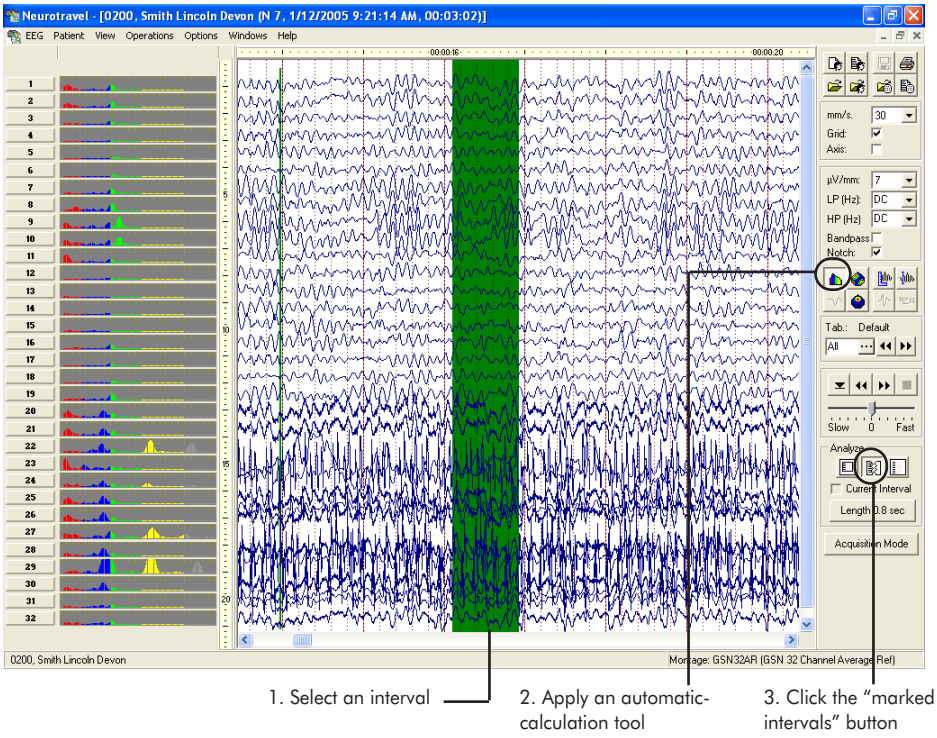


Figure 5-42. Analyzing the channel spectrum of only a selected interval

Print Review Button

The Print Review button (Figure 5-43), in the upper-right corner of the Review control panel, allows you to print the entire exam or marked intervals. Printouts are based on the sensitivity values, filters, and current speed specified in the Review control panel; this information is displayed at the bottom of the printed page.

Figure 5-43. Print Review button

(The configuration dialog and the print preview should display after you click the Print button. To verify, choose **Options > System** and ensure that the "Show configuration dialog" and the "Print preview" checkboxes are selected; Figure 5-44. For more information, see "Print Parameters" on page 187.)

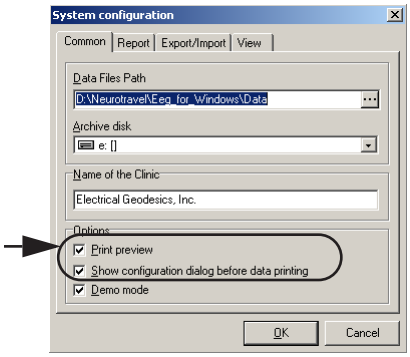
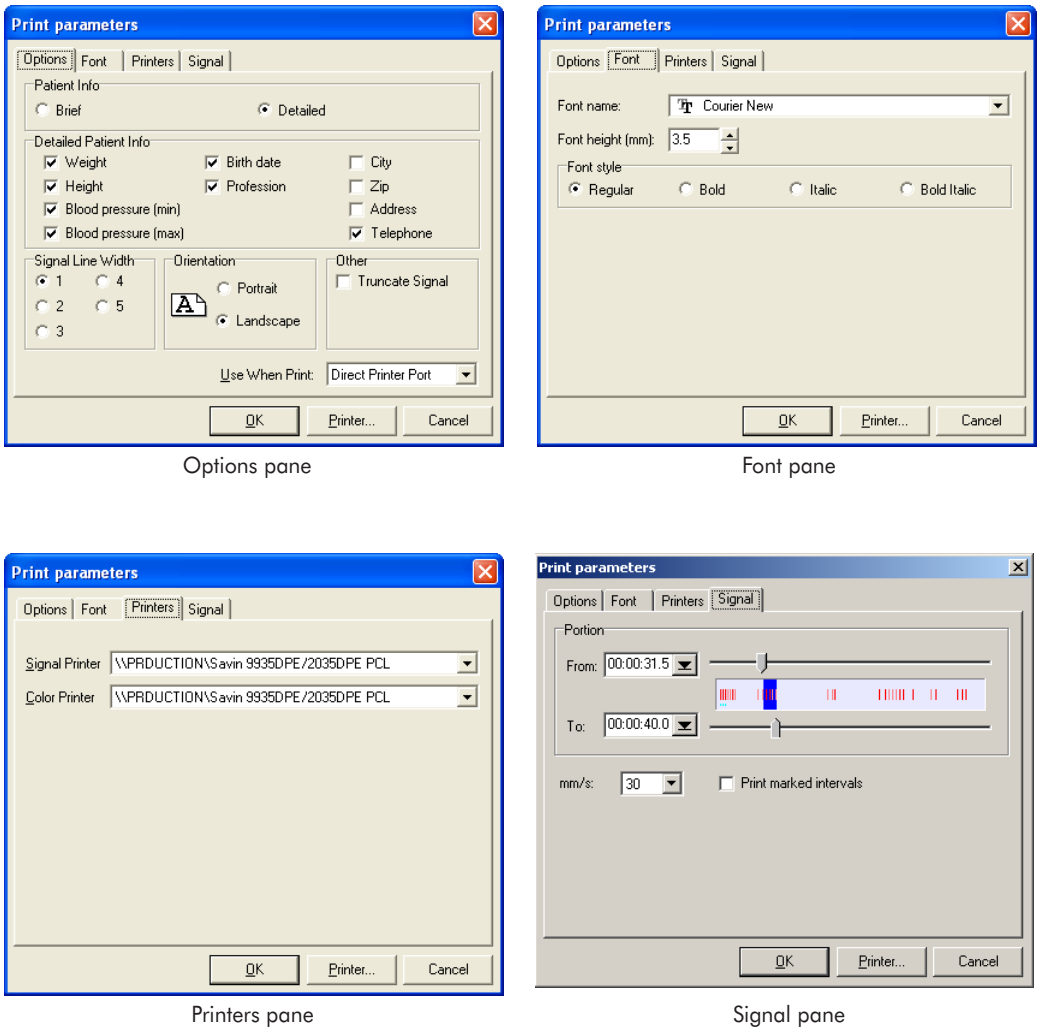


Figure 5-44. Check the print parameters

To print:

1. Click the Print Review button in the Review control panel, which opens the Print Parameters dialog; here is where you specify the printing layout.

   The Print Parameters dialog presents a bar graph of the entire exam and highlights (in color) the areas to be printed. The dialog consists of four panes: Options, Font, Printers, and Signal (Figure 5-45).



Options pane

Font pane

Printers pane

Signal pane

Figure 5-45. Print parameter panes

2 Click the Signal tab, which shows all the events in the exam; if you have "marked up" the trace with saved intervals, the option to print only the marked intervals is active (Figure 5-46).

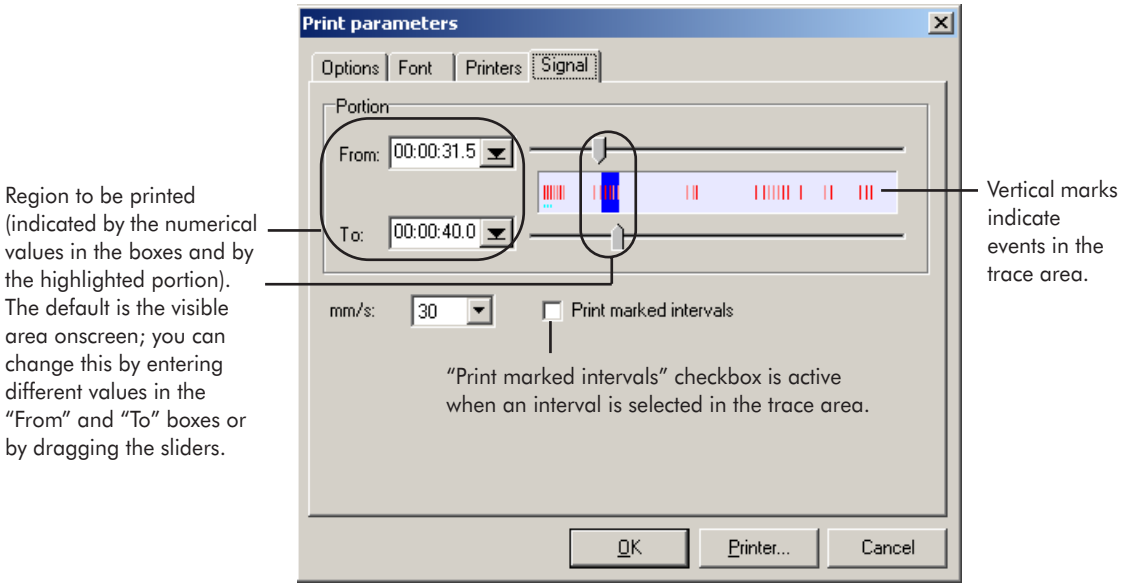


Figure 5-46. Signal pane

3 Click OK in the Print Parameters dialog, which opens the Print Preview window.

4 Click the control keys at the top of the Print Preview window to navigate through the different pages, zoom in or zoom out, or redefine the previous selected settings (Figure 5-47).

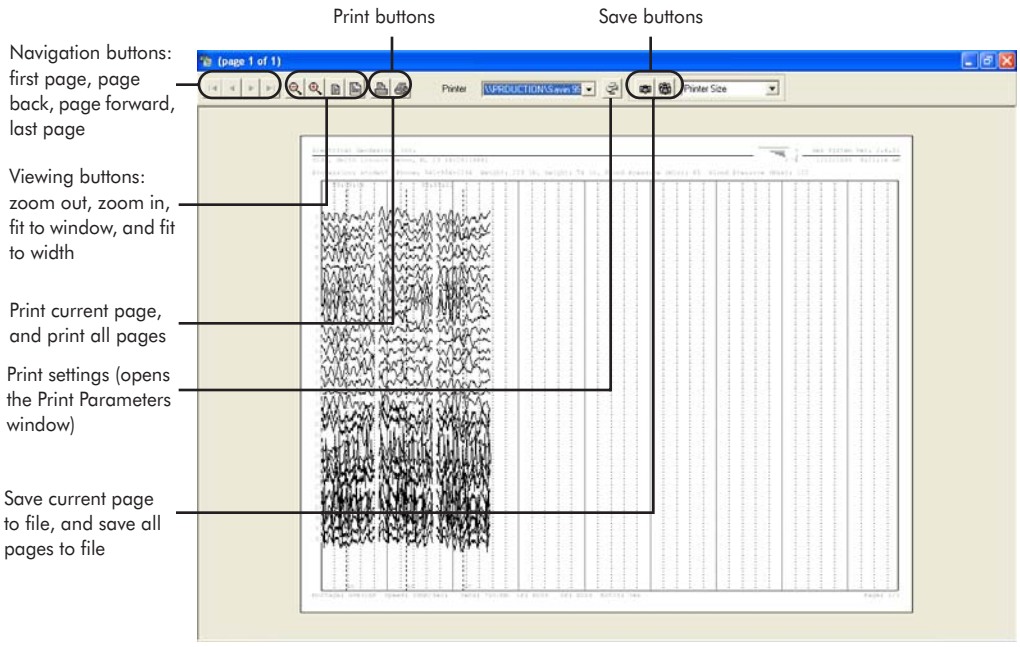


Figure 5-47. Print preview of the marked intervals, not the entire trace

5 Click the "print current" or "print all" button to produce a hard-copy version of the chart, or click the "save current" or "save all" button to produce a graphics file of the chart (Figure 5-48).

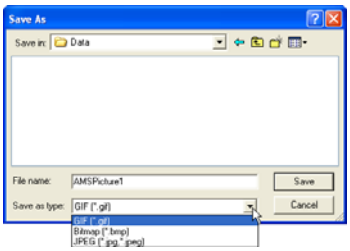


Figure 5-48. Save the data as a GIF, bitmap, or JPEG file

The current print settings are saved at the end of the print process or at the end of the work session.

Print Window Command

You can also choose **EEG > Print Window** to print the current window onscreen without previewing the printout.

chapter 6

AUTOMATIC CALCULATIONS

You can apply a variety of automatic calculations to the EEG data: measure the amplitude of every channel, produce spectral maps, and perform spectral analysis for each channel or each channel pair. Automatic calculations are useful for real-time monitoring of critical patients, such as those in intensive care units. All but amplitude mapping are operable during either acquisition or review; you can map the amplitude *only in review mode*. Each calculation function is described in this chapter.

Amplitude Mapping

The amplitude-mapping ("wavy") button (Figure 6-1) appears in the middle-right part of the Review control panel. This button allows you to measure the amplitude (in microvolts) of two timepoints in each channel, in review mode.

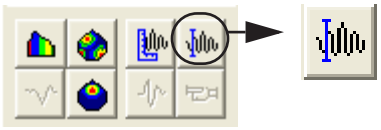


Figure 6-1. Amplitude-mapping button

Color Schemes

The software assigns default colors to the timepoints, markers, maps, and so forth. To change the colors of the amplitude timepoints, choose **Options > Display** and click the EEG tab.

In the EEG pane, the Amplitude [–] and Amplitude [+] pop-up color menus allow you to specify the colors for the first and second timepoints, respectively (Figure 6-2).

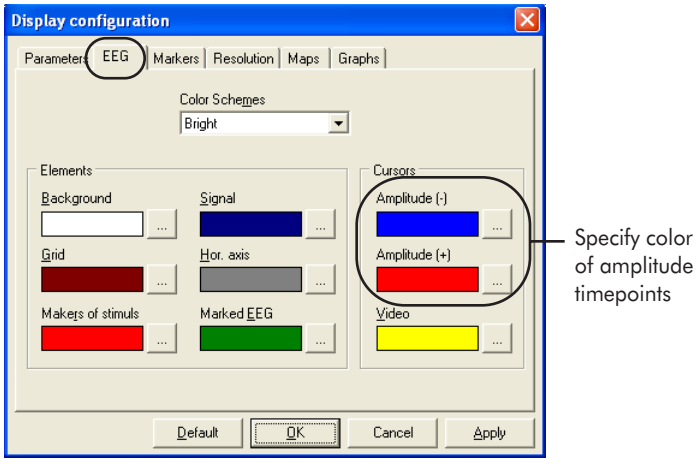


Figure 6-2. User-selected colors for the amplitude timepoints

To change the color scheme used for the maps, click the Maps tab (Figure 6-3).

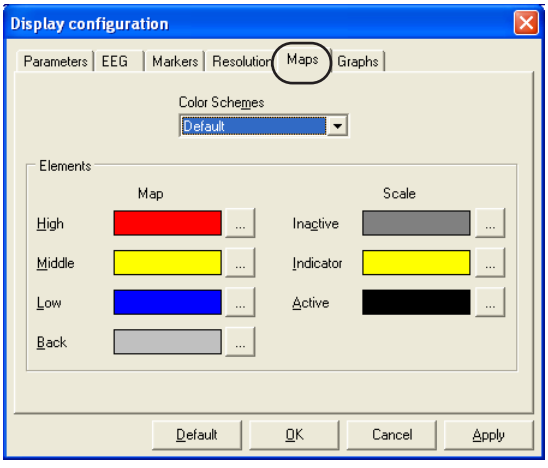


Figure 6-3. Map colors

Measuring Amplitudes

Amplitude-mapping button

To measure amplitude timepoints in an exam, click the amplitude-mapping button to display maps and a table of the amplitudes (in microvolts) of each channel represented (Figure 6-4). You can drag the timepoints to measure other sections; the information in the maps and table updates automatically.

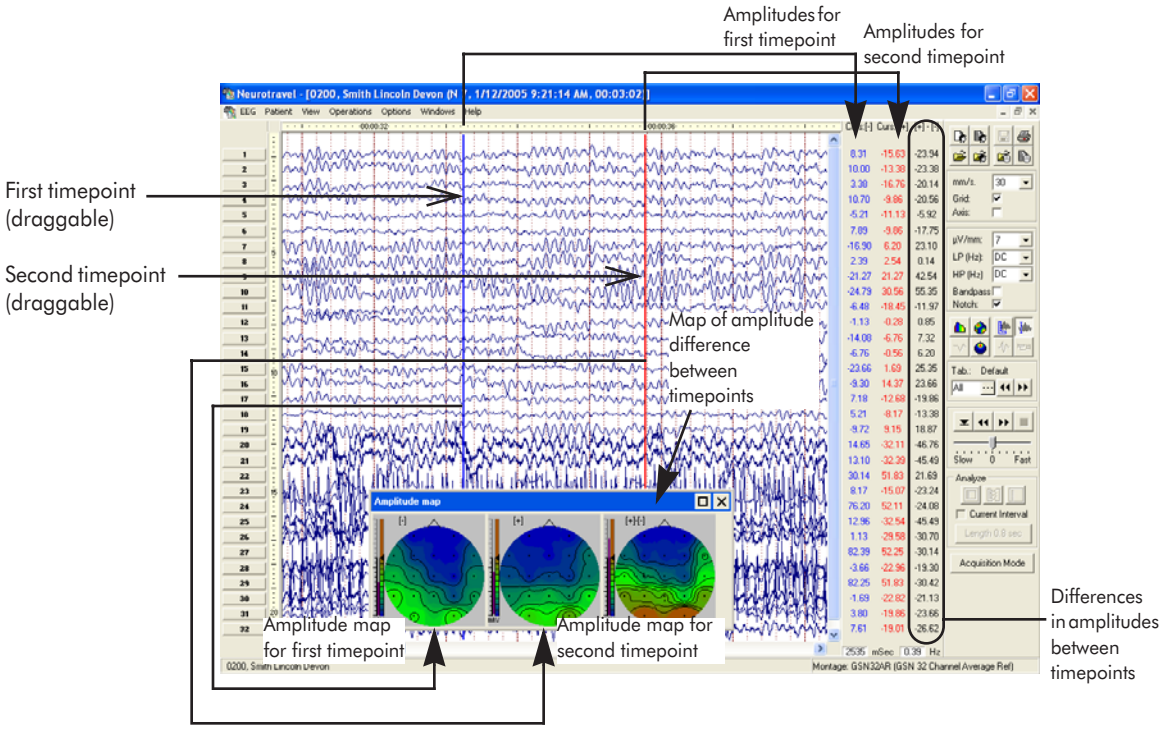


Figure 6-4. The amplitude maps, table, and markers

Amplitude Maps

The maps represent the amplitude distributions on the patient's scalp of the first [–] and the second [+] timepoints, and the difference between the two ([+] – [–]). You can change the spectrum values by dragging the slider on the spectrum bar (Figure 6-5). When you roll the cursor over any of the maps, a box in the top-right corner of the map window shows the amplitude value beneath the cursor.

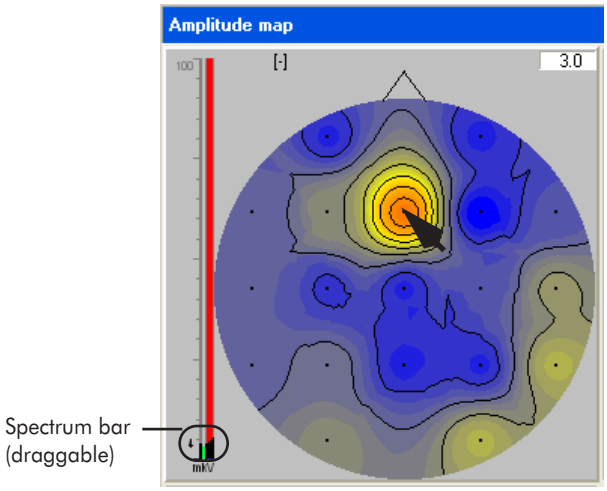


Figure 6-5. Amplitude value under cursor

Click the square "map-resize" button in the Amplitude Maps window to enlarge the maps; click again to revert to the previous size (Figure 6-6).

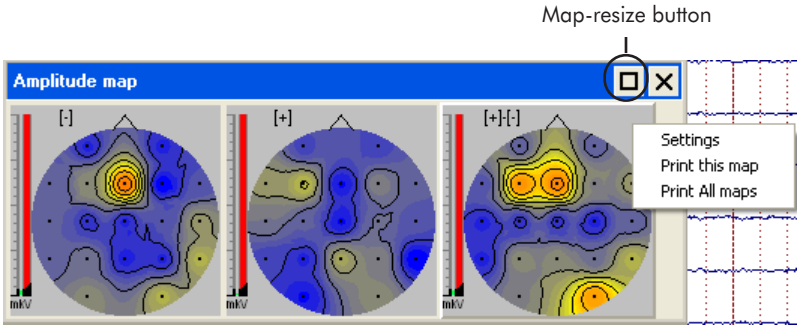
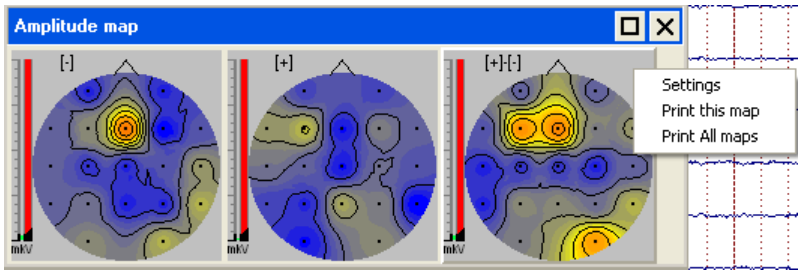
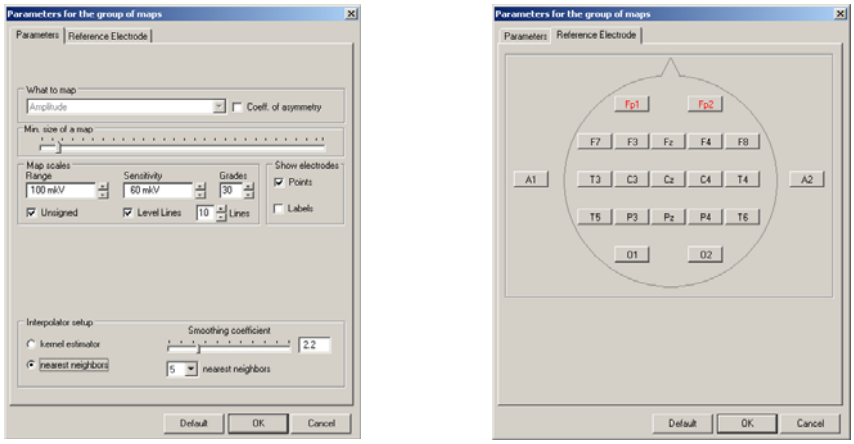


Figure 6-6. "Map-resize" button

Right-click on a map to display a pop-up menu that contains the Settings and Print commands (Figure 6-7).



Settings



Print

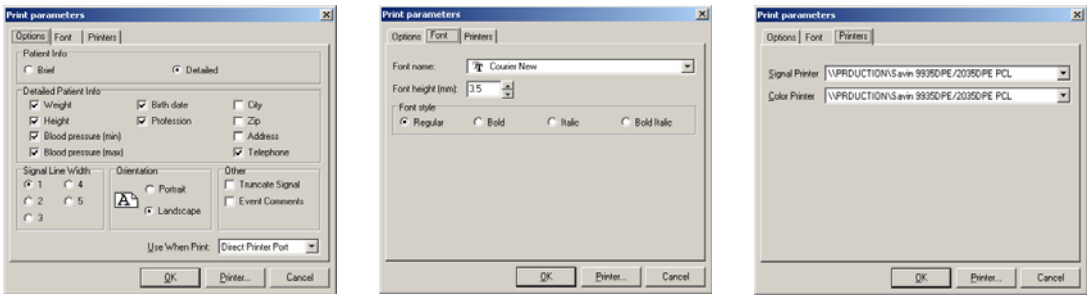


Figure 6-7. Map settings and printing parameters

Figure 6-8 shows a larger view of the Parameters pane for the amplitude-mapping function.

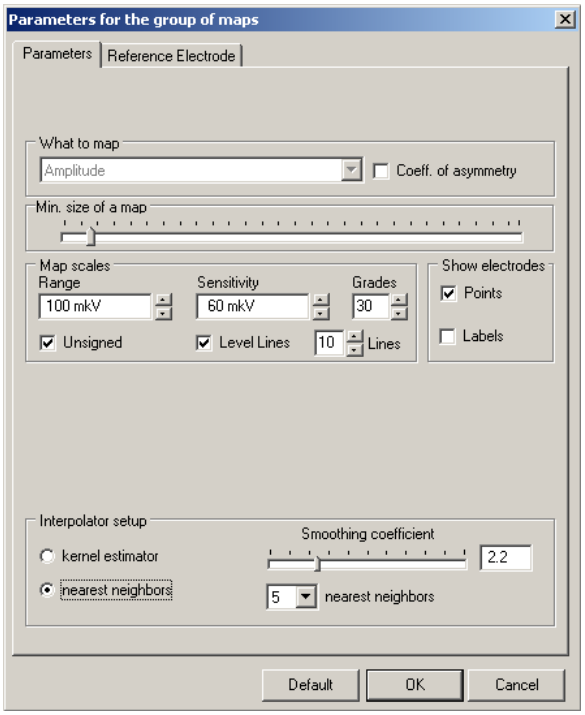


Figure 6-8. Amplitude-map parameters

1 In the Parameters pane, select the minimum map size and map-scale features (the "Level Lines" are *isopleths*, lines drawn on a map through all points of equal value of some measurable quantity; Figure 6-9).

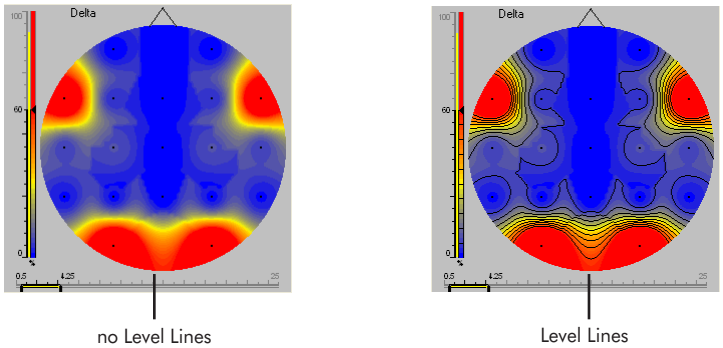


Figure 6-9. Level Lines function

2 Choose whether to display the points and labels of the electrodes on the maps by clicking the Points and Labels checkboxes in the "Show electrodes" section.

3 Determine the interpolation setup by choosing the algorithm that interpolates the color on the maps:

- *kernel estimator*: a value that defines a statistical algorithm for interpolation that centers a kernel function at each datapoint and smooths out the contribution of each observed datapoint over a local neighborhood
- *nearest neighbor*: a value that defines a simple mathematical algorithm for interpolation that assumes that the density at any datapoint is inversely proportional to the distance to the *k*th nearest datapoint

4 Click OK when the parameter values are satisfactory (or click the Default button for the standard setup).

Amplitude Table

The amplitude table provides amplitude measurements of the two timepoints for each channel in numerical form; in addition, it displays the time between the two intervals (in milliseconds) and their relative reciprocal frequency (in Hertz); Figure 6-10.

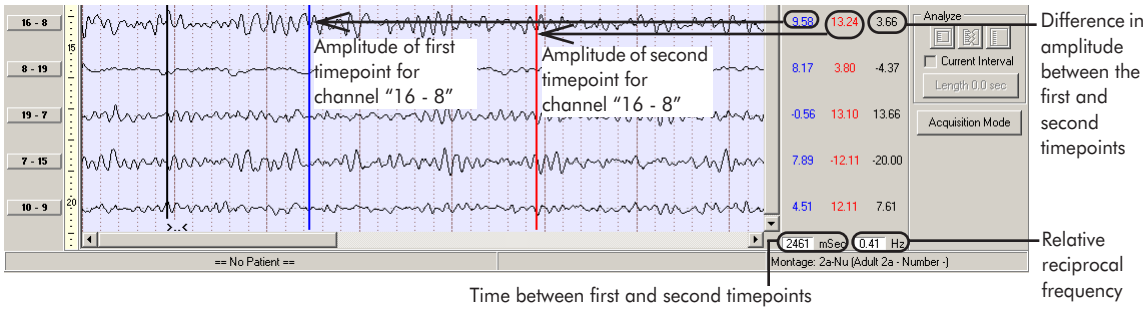


Figure 6-10. Amplitude differential

Spectral Brain Mapping

Spectral brain mapping allows you to view the frequency distribution on a patient's scalp, in either acquisition or review mode. To apply, click the spectral brain-maps button (Figure 6-11) in the control panel.

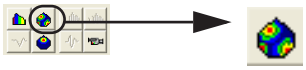


Figure 6-11. Spectral brain-maps button

Maps representing delta, theta, alpha, beta, and other frequency bands are available, with user-definable parameters such as amplitude, energy, relative energy, maximum spectral density, and average spectral density. As many as 32 maps over a 30 Hz frequency range, using a variety of colors, can be visualized for creating finely differentiated images.

Color Schemes

The software assigns default colors to the maps. To change the color schemes used for the maps, choose **Options > Display** and click the Maps tab (Figure 6-12).

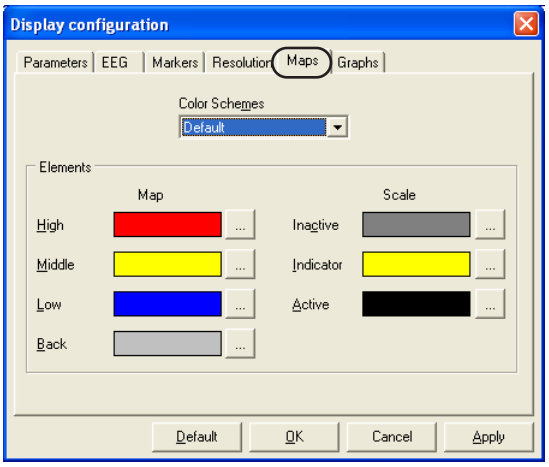


Figure 6-12. Map colors

Map Parameters

To activate the spectral brain-mapping function:

1 Click the spectral brain-maps ("multicolored scalp") button in the control panel to open the Spectral Maps window, which displays maps of frequency bands such as delta and theta for the *visible area onscreen* (Figure 6-13); you can change the time window to the *entire exam* by clicking the "All" button in the analysis controls section.

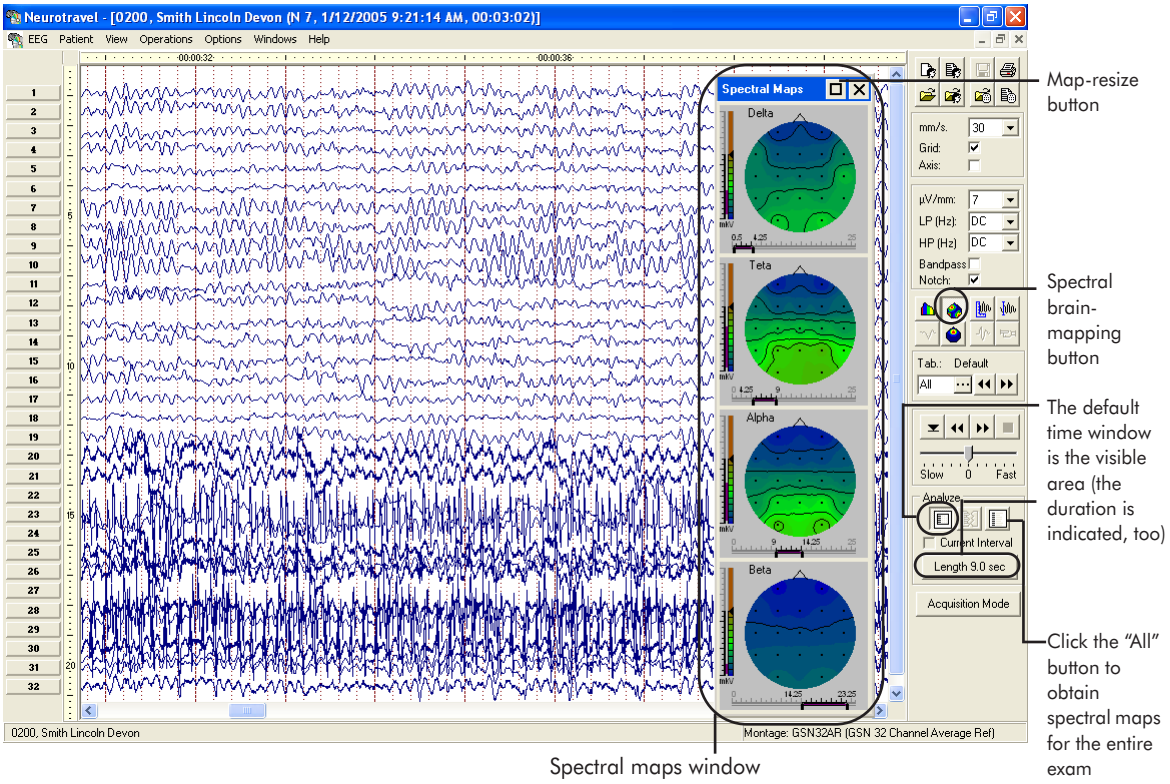


Figure 6-13. Spectral brain mapping applied

2 Choose your preferred map size by clicking the square "map-resize" button next to the Close ("X") button in the Spectral Maps window to enlarge the maps; click again to revert to its previous size.

3 Right-click on a map and choose the map alignment from the resulting pop-up menu (bottom, top, right, left, or center of the window; Figure 6-14).

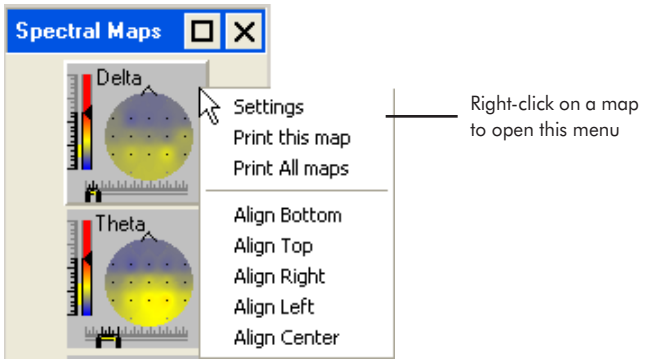


Figure 6-14. Spectral brain-map options

4 Right-click on a map and select Settings from the resulting pop-up menu; this opens the Parameters dialog (Figure 6-15).

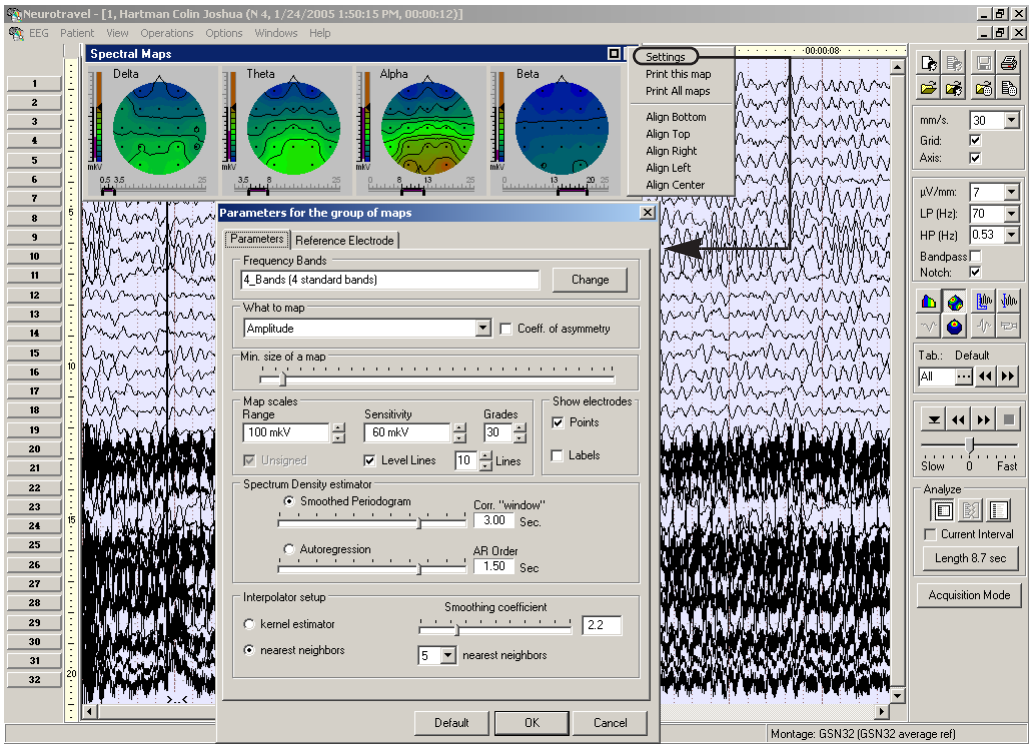


Figure 6-15. Parameters dialog

5 In the Parameters dialog, click the Reference Electrode tab to choose the electrode references for the spectral-map configurations (Figure 6-16). You choose the electrodes by clicking on the buttons in the pane.

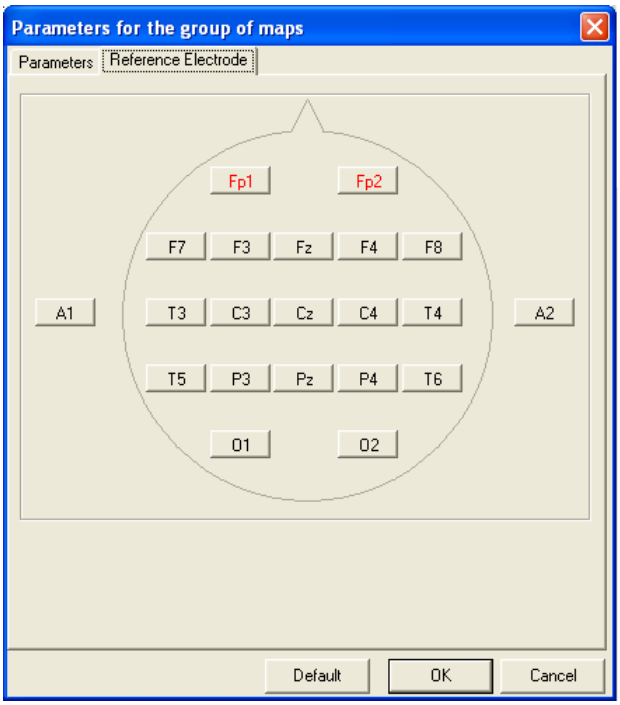


Figure 6-16. Electrodes for the spectral brain-mapping function

6 Click the Parameters tab (Figure 6-17) to enter values for the calculation and display parameters. Open the "What to map" pop-up menu and select from the following:

- *amplitude (μV)*: absolute value on an equivalent sine wave for every band interpolated on the maps
- *energy (μV^2)*: absolute amplitude for every band interpolated on the maps
- *relative energy (%)*: median amplitude for every band interpolated on the maps
- *maximum spectral density ($\mu V^2/2$)*: absolute spectrum density for every electrode interpolated on the maps
- *average spectral density ($\mu V^2/2$)*: median spectrum density for every electrode interpolated on the maps

7 If desired, select the "Coefficient of asymmetry" checkbox in the "What to map" section.

The coefficient of asymmetry estimates the hemispheric percentage contribution, positive or negative.

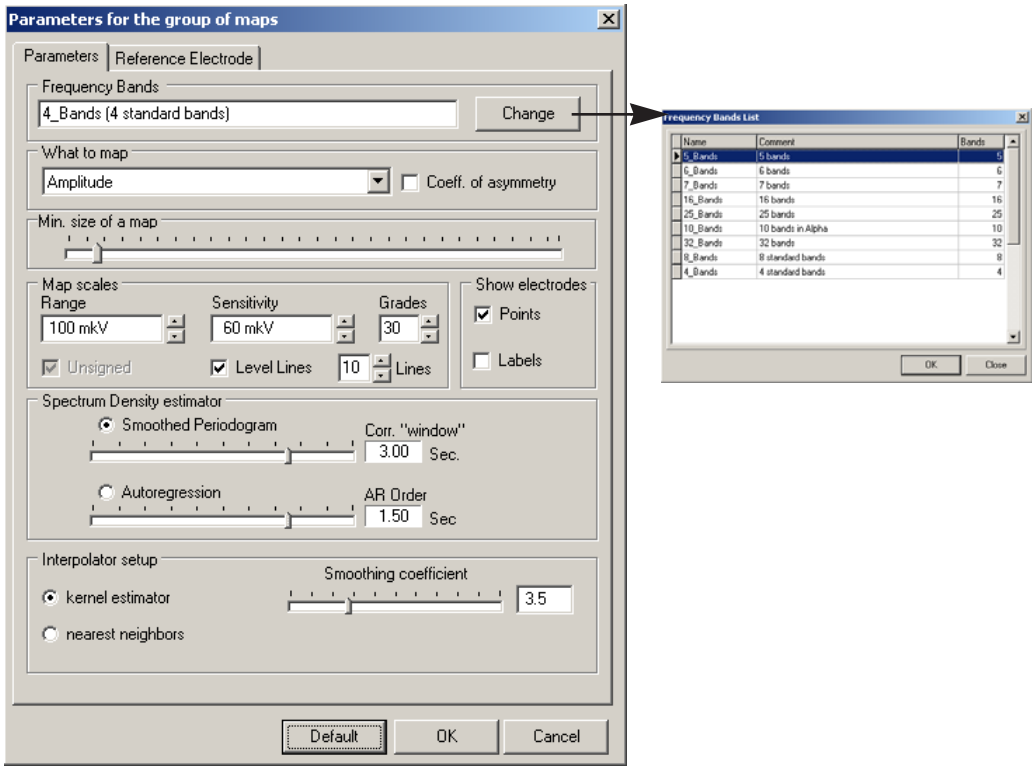


Figure 6-17. Spectral brain-map parameters

8 Click the Change button next to the Frequency Bands text box to open a menu of frequency bands (Figure 6-17), select the option that provides the desired number of maps and relative frequency for your analysis, and click OK.

9 In the Parameters pane, select the minimum map size and map-scale features (the "Level Lines" are *isopleths*, lines drawn on a map through all points of equal value of some measurable quantity; see Figure 6-9 on page 128).

10 Choose a spectrum density estimator:

- *smoothed periodogram*: this nonparametric estimator, which employs discrete Fourier transformation of the time series, is the more common choice and is used mainly in spectral analysis systems.
- *autoregression*: this parametric estimator, which uses a mathematical model that predicts the next variable based on the previous variable, tends to be more precise because it focuses on a portion of the signal (for example, sharp peaks) rather than the spectrum.

11 Choose whether to display the points and labels of the electrodes on the maps by clicking the Points and Labels checkboxes in the "Show electrodes" section.

12 Determine the interpolation setup by choosing the algorithm that interpolates the color on the maps:

- *kernel estimator*: a value that defines a statistical algorithm for interpolation that centers a kernel function at each datapoint and smooths out the contribution of each observed datapoint over a local neighborhood
- *nearest neighbor*: a value that defines a simple mathematical algorithm for interpolation that assumes that the density at any datapoint is inversely proportional to the distance to the *k*th nearest datapoint

13 Click OK when the parameter values are satisfactory (or click the Default button for the standard setup).

Map Details

During review, when you roll the cursor over any of the maps, a box in the top-right corner of the map window shows the value beneath the cursor (Figure 6-18). During acquisition, this value is revealed in the box, but it does *not* automatically update as the trace scrolls.

The maps each contain two scales, indicating frequency and sensitivity (Figure 6-19).

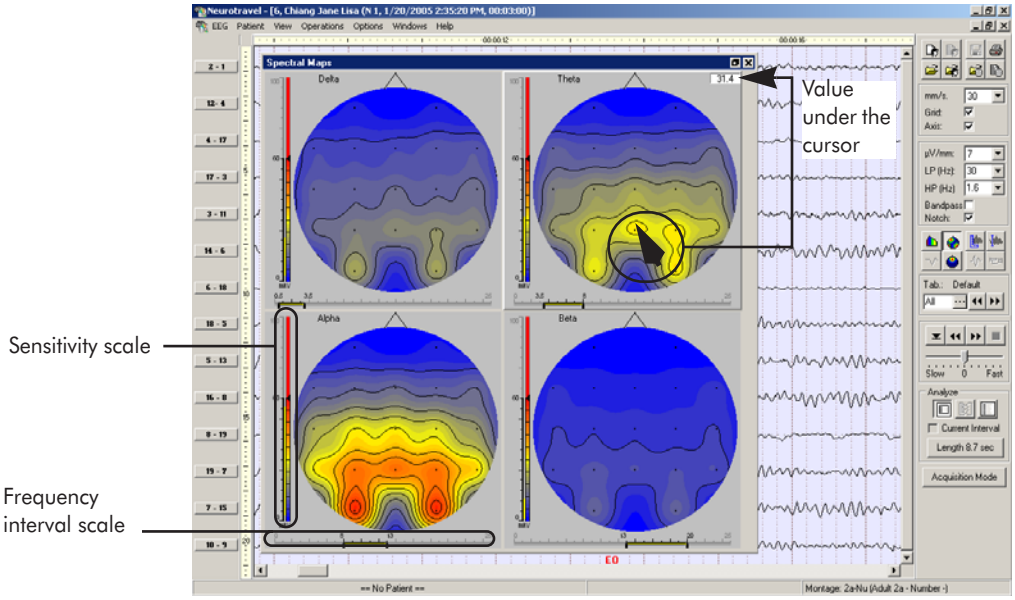


Figure 6-18. Spectral maps

The frequency interval indicates the frequency band displayed for that map. You can drag either edge of the interval to change the frequency band. The other maps automatically update, if affected by the change.

The sensitivity scale determines the color and topographic distribution of the map. You can change the scale by dragging the multicolor spectrum bar; the units of sensitivity in mKV are indicated to the left. The other maps automatically update, if affected by the change.

Also to the left is a solid color bar that indicates the group weighted value for the current calculation inside the analyzed range. This value remains constant.

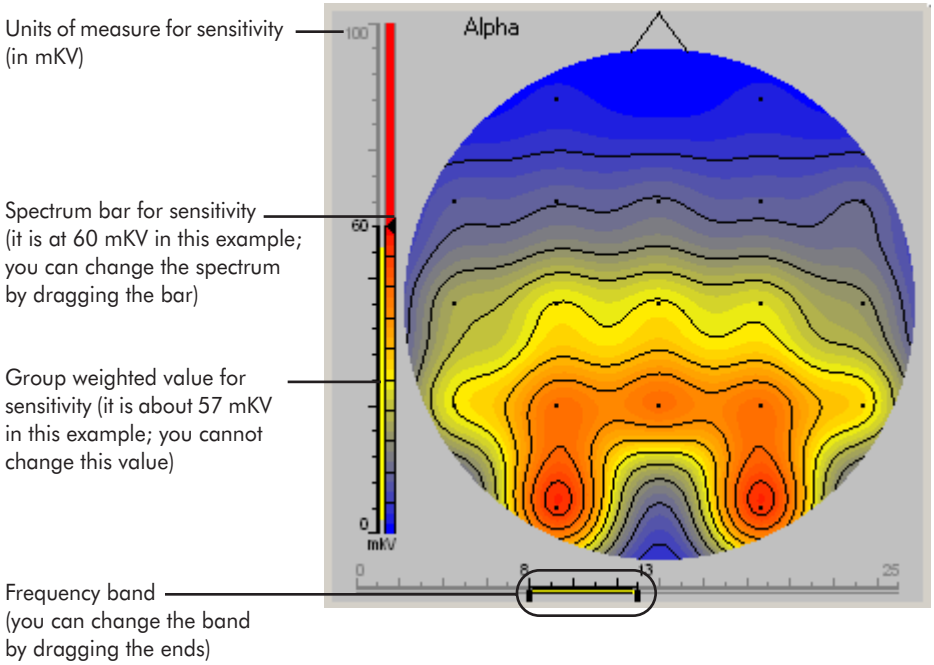


Figure 6-19. Frequency interval and sensitivity scales

To print the maps, right-click in a map window and select Print This Map or Print All Maps from the resulting pop-up menu (see Figure 6-14 on page 132). The Print Parameters dialog opens (see Figure 6-15 on page 132), allowing you to define the printing setup.

Channel Spectrum

The channel-spectrum button ("multicolored graph"; Figure 6-20) in the control panel enables you to display a graph of each channel spectrum, in either acquisition or review mode.

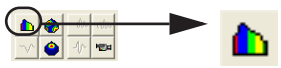


Figure 6-20. Channel-spectrum button

Color Schemes

The software assigns default colors to the graphs. To change the color schemes used for the graphs, choose **Options > Display** and click the Graphs tab (Figure 6-21).

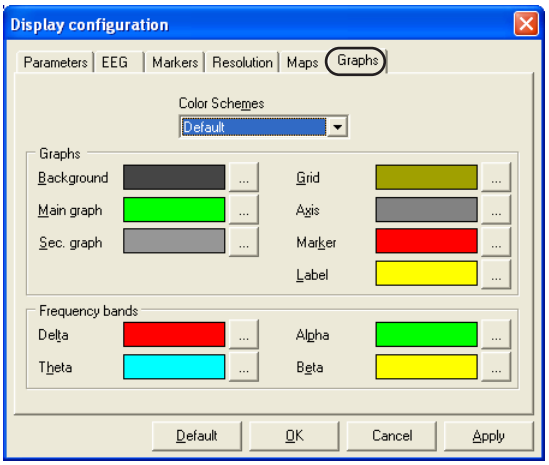


Figure 6-21. Graph colors

Graph Settings

To activate the channel-spectrum function:

1 Click the channel-spectrum button to open a window displaying the spectrum graph for each channel (Figure 6-22).

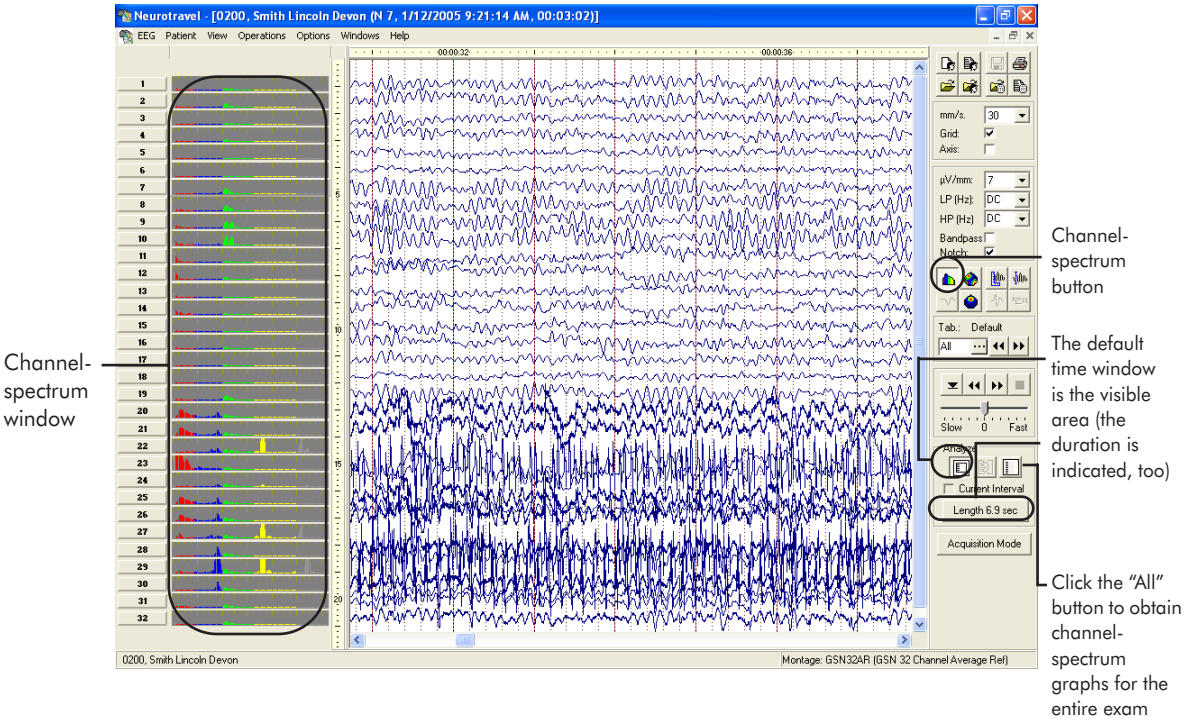


Figure 6-22. Spectrum graphs for each channel

The spectral representation refers to different frequency bands, with a 40 Hz interval. By default, the channel-spectrum graphs represent the visible area onscreen; to change the graphs to represent the entire exam, click the "All" button in the analysis controls section of the control panel.

2 To modify the spectral calculation and display parameters, right-click anywhere in the spectrum window and choose Settings from the resulting pop-up menu; this opens the Parameters of Spectrum Graphs dialog (Figure 6-23).

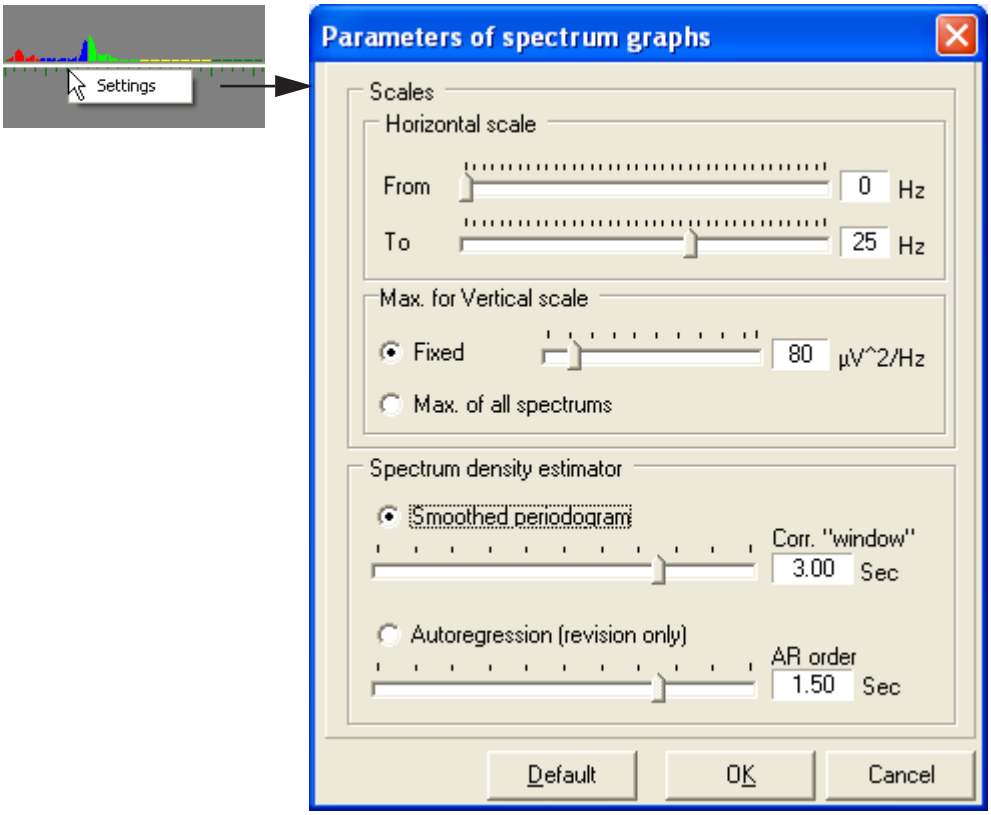


Figure 6-23. Parameters of Spectrum Graph dialog

3 Set the horizontal and vertical scales. The vertical scale has two options:

- *fixed*: used for comparing each channel with a given value (typically less than 80 $\mu V^2/Hz$)
- *maximum of all spectrums*: used for discovering which channel has the highest spectral peak and rescales the graph based on this peak

4 Choose a spectrum density estimator:

- *smoothed periodogram*: this nonparametric estimator, which employs discrete Fourier transformation of the time series, is the more common choice and is used mainly in spectral analysis systems.
- *autoregression*: this parametric estimator, which uses a mathematical model that predicts the next variable based on the previous variable, tends to be more precise because it focuses on a portion of the signal (for example, sharp peaks) rather than the spectrum.

5 Click OK when the parameter values are satisfactory (or click the Default button for the standard setup).

Analysis Information

For a closer view of a specific graph, click in the spectrum window next to the channel. The individual channel-spectrum window appears, with a graph showing an enlarged image of the channel spectrum. This enlarged view extends the analysis interval to 64 Hz and provides additional information such as amplitude and energy. To print the graph with all the spectral data, click the Print button (Figure 6-24).

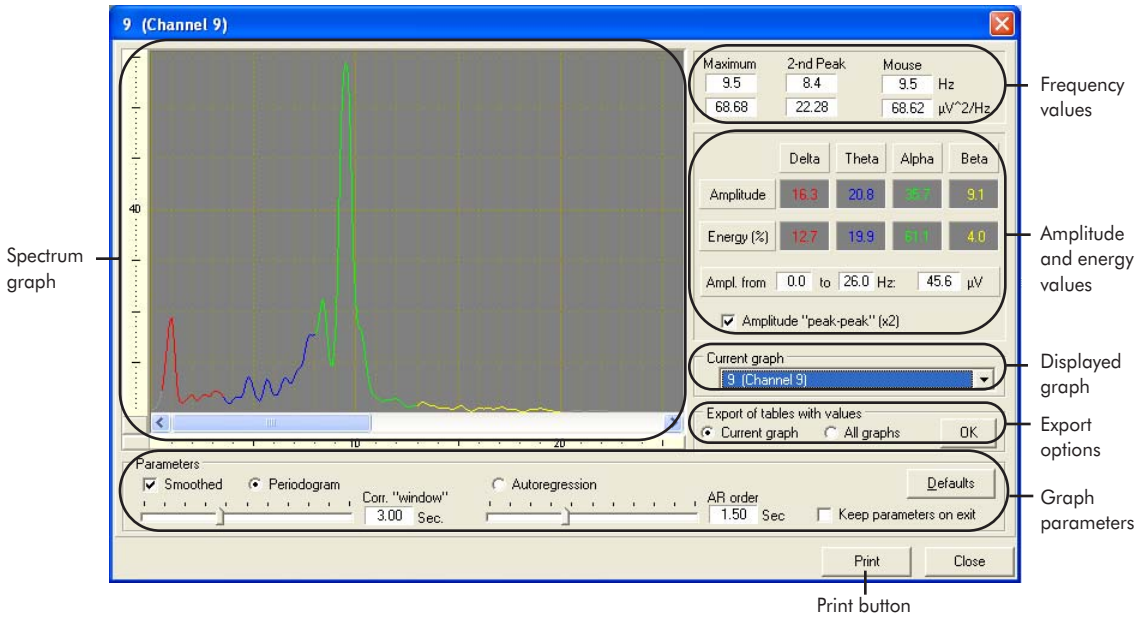


Figure 6-24. Individual channel-spectrum window

The main components of the individual channel-spectrum window are the spectrum graph, frequency values, amplitude and energy values, displayed graph window, export options, and graph parameters sections.

Each is briefly described in the following sections.

Spectrum Graph

A large part of the spectrum window is devoted to the spectrum graph, which charts the delta, theta, alpha, and beta values in different colors (Figure 6-25).

Figure 6-25. Channel-spectrum graph

Frequency Values

To the right of the spectrum graph, at the top, are frequency values for the highest peak and the second-highest peak. The third column displays the coordinates under the cursor, as you move it over the spectrum graph (Figure 6-26).

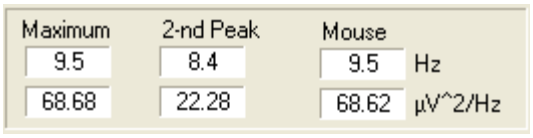


Figure 6-26. Frequency values

Amplitude and Energy Values

Below the frequency values are the amplitude and energy values of the delta, theta, alpha, and beta bands for the analysis interval (Figure 6-27). Select the "Amplitude" checkbox to measure the amplitude from peak to peak.

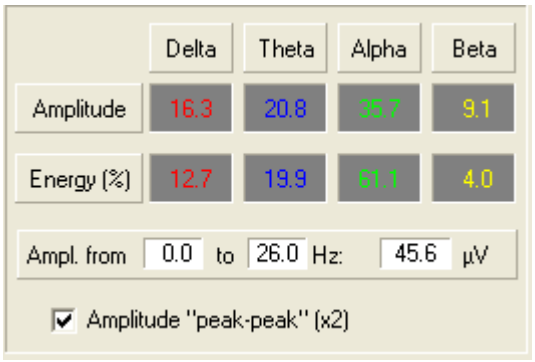


Figure 6-27. Amplitude and energy values

Displayed Graph

Below the amplitude and energy values is a "current graph" pop-up menu (Figure 6-28) that allows you to choose a different channel, to view its channel-spectrum graph and information.

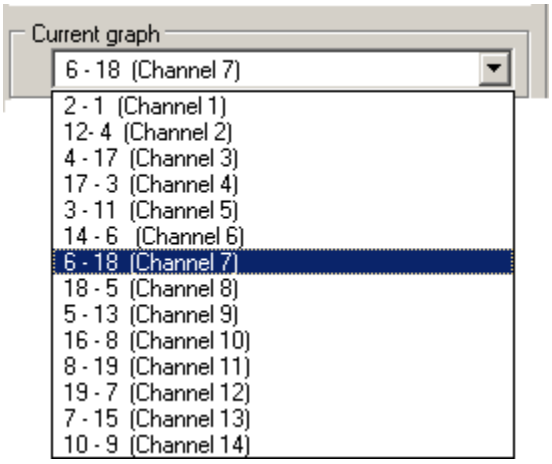


Figure 6-28. Current graph pop-up menu

Export Options

Below the "current graph" menu are the "export" option buttons (Figure 6-29). These buttons allow you to export graphs and values (in a codified form) from the current graph or from all graphs, for processing in another software program.

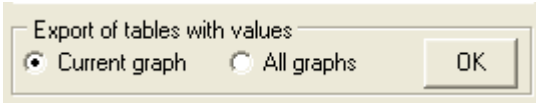


Figure 6-29. Export options

(To request the codified format of the exported data, contact EGI. However, EGI does not provide the external software to read the exported format.)

Parameters Section

At the very bottom of the window is the “parameters” section. This section contains options for the spectral density estimator (periodogram or autoregression; see page 135 for descriptions), and also the “keep parameters” checkbox for saving output settings (Figure 6-30).

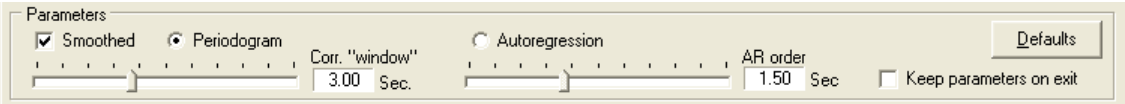


Figure 6-30. Parameters section

An Even Closer Look

The individual channel-spectrum window allows you to obtain an even closer view of the graph.

1. Left-click in the channel-spectrum graph and drag until the area of interest is encompassed.

2. Release the mouse key and an enlarged view of only the selected area appears in the channel-spectrum graph area. The amplitude “from” and “to” values change to represent only that enlarged portion of the graph.

3. To revert to the original size, right-click in the channel spectrum graph and choose Unzoom from the resulting pop-up menu.

Coherence Spectra

The coherence-spectra (“highlighted scalp”; Figure 6-31) button in the control panel provides access to the spectral analysis function for each channel pair (based on the current montage), in either acquisition or review mode.

Figure 6-31. Coherence-spectra button

Color Schemes

The software assigns default colors to the graphs. To change the color schemes used for the graphs, choose **Options > Display** and click the Graphs tab (Figure 6-32).

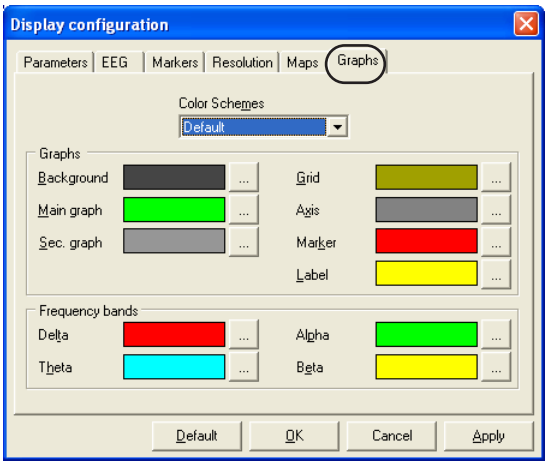


Figure 6-32. Graph colors

Graph Settings

To activate the coherence-spectra function:

1 Click the coherence-spectra button to open a window displaying the coherence-spectra graph for each adjacent channel pair in the trace area; for example, the first coherence spectra in Figure 6-33 is for channels 1 and 2, the next is for channels 3 and 4, and so on.

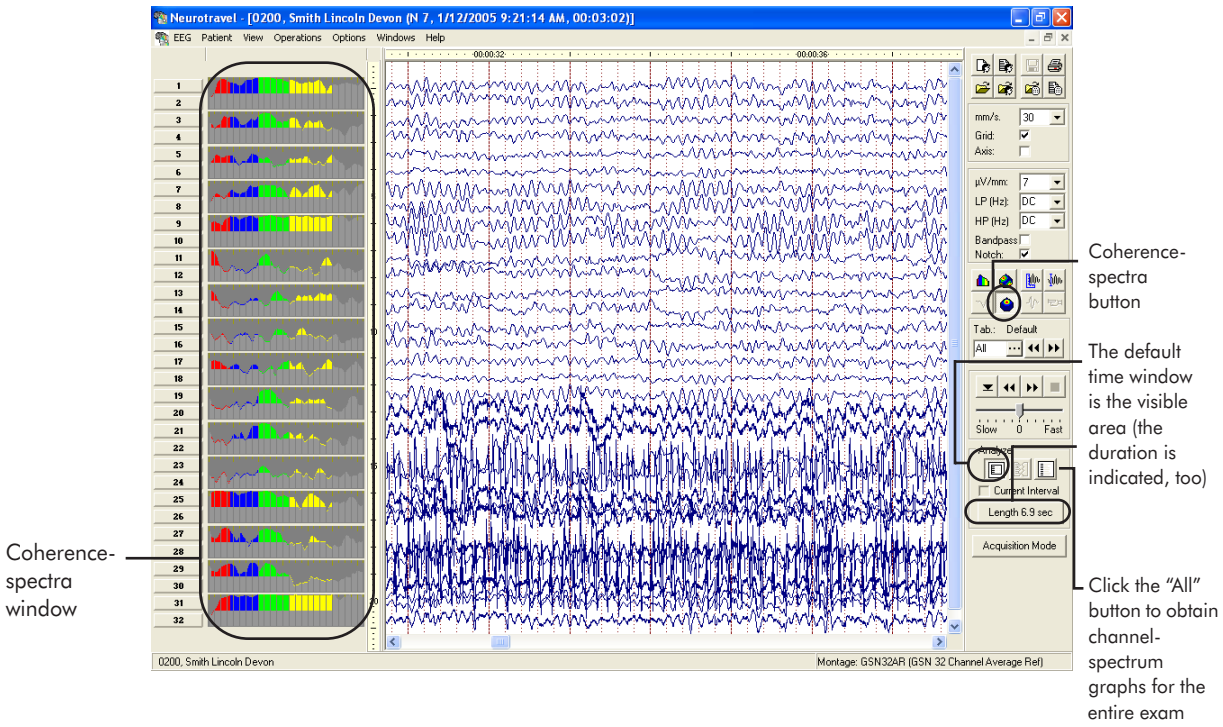


Figure 6-33. Coherence spectra for the channels

The spectral representation highlights the corresponding bands in color if *significant* values (those greater than 0.5) have occurred. By default, the coherence-spectra graphs represent the visible area onscreen; to change the graphs to represent the entire exam, click the "All" button in the analysis controls section of the control panel.

2 To modify the coherence spectral calculation and display parameters, right-click in the spectrum and choose Settings from the resulting pop-up menu; this opens the Parameters dialog (Figure 6-34).

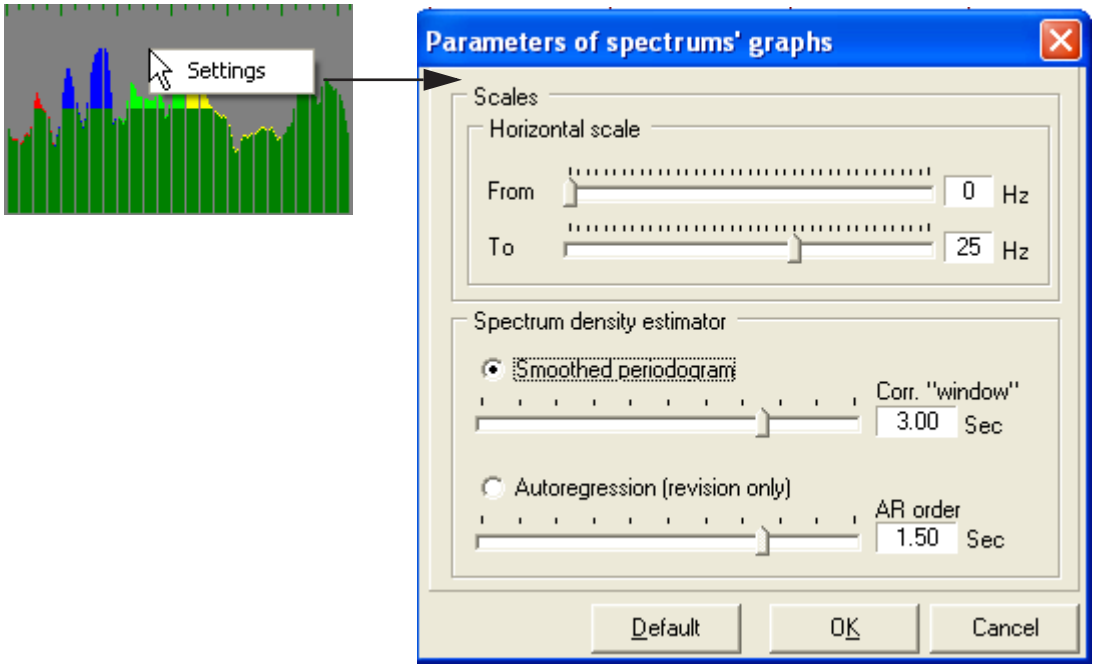


Figure 6-34. Spectral-analysis parameters dialog

3 Set the horizontal scale, using the sliders.

4 Choose a spectrum density estimator:

- *smoothed periodogram*: this nonparametric estimator, which employs discrete Fourier transformation of the time series, is the more common choice and is used mainly in spectral analysis systems.
- *autoregression*: this parametric estimator, which uses a mathematical model that predicts the next variable based on the previous variable, tends to be more precise because it focuses on a portion of the signal (for example, sharp peaks) rather than the spectrum.

5 Click OK when the parameter values are satisfactory (or click the Default button for the standard setup).

Analysis Information

For a closer view of a specific coherence spectral analysis, click in the spectrum next to the channel pair. The channel pair spectrum window appears, with a graph showing an enlarged image of the channel pair spectrum. The enlarged view also provides additional information such as amplitude and energy.

The enlarged coherence spectrum window provides nearly the same information as the channel-spectrum window (see "Analysis Information" on page 141 for descriptions of the window controls).

The lone exception is that instead of the channel band information provided in the individual spectrum window, the channel spectrum window offers three buttons that allow you to specify what estimator to graph (Figure 6-35).

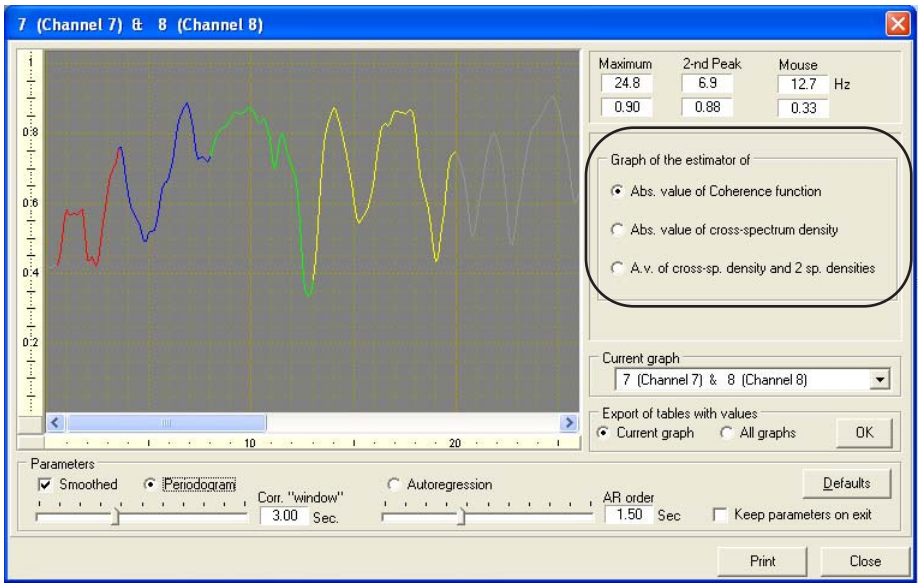


Figure 6-35. Close-up view of coherence spectra analysis

The estimator choices are:

- *absolute value of coherence function*: the mathematical function that compares two signals
- *absolute value of cross-spectrum density*: the difference in spectrum of two signals

- *absolute value of cross-spectrum density and two spectrum densities*: combines the difference in spectrum of two signals with two other spectrum densities

An Even Closer Look

To enlarge a portion of the coherence spectra further in the channel pair spectrum window, see "An Even Closer Look" on page 145.

chapter 7

FUNCTION TOOLS

The function tools are designed to help you manage and organize your Neurotravel files once you have acquired and processed the data. Neurotravel's function tools include Import/Export, Data Archive, and Session Delete. This chapter describes each of the tools and their options.

(For a brief list of acquisition procedures, see "Example EEG Viewing/Archiving" on page 240. For information about the archive disk, see "Archive Disk" on page 228.)

Import and Export

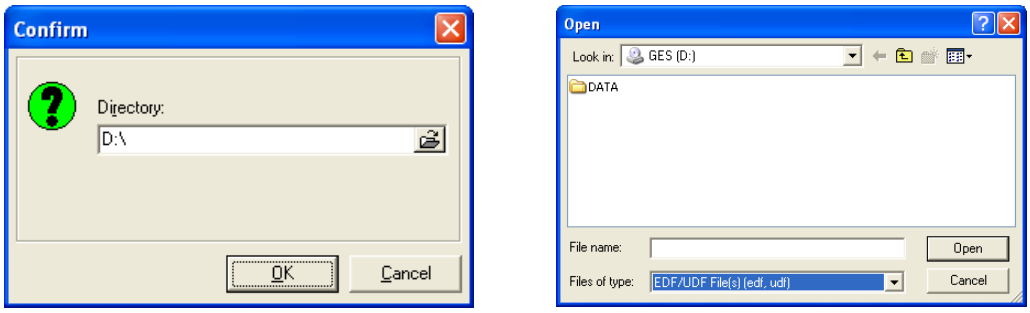
The data import and export functions allow Neurotravel Win to interface with different systems.

Data Import

To import data, choose **Operations > Data Import** to open a pop-up menu of file formats:

- *Neurotravel:* Manages the importing of files in the Neurotravel format from disk or from an external system.
- *European Data Format (EDF+)*: Manages the exchange of data between systems, according to the EDF or EDF+ standard.

Figure 7-1 shows the file-selection boxes that appear when you select Neurotravel or EDF, respectively.



Neurotravel import dialog

EDF import dialog

Figure 7-1. Importing data in the Neurotravel (left) and EDF (right) standards

Data Export

To export data, choose **Operations > Data Export** to open a pop-up menu of file formats:

- *Neurotravel*: Manages the export of files in the Neurotravel format to disk or to an external system.
- *Stellate*: Manages the export of files in the Stellate format for Eclipse software (used for sleep analysis). This function is available only for bipolar traces, and the applied montage must be the same as the montage defined in the Eclipse software. For the use and configuration of Eclipse software, please refer to that manufacturer's user's manual.
- *European Data Format (EDF+)*: Manages the exchange of data between systems, according to the EDF or EDF+ standard.

When you choose any of the export formats, the Exams List appears (Figure 7-2). You can choose one exam or more (by Control-clicking) to export in the selected format.

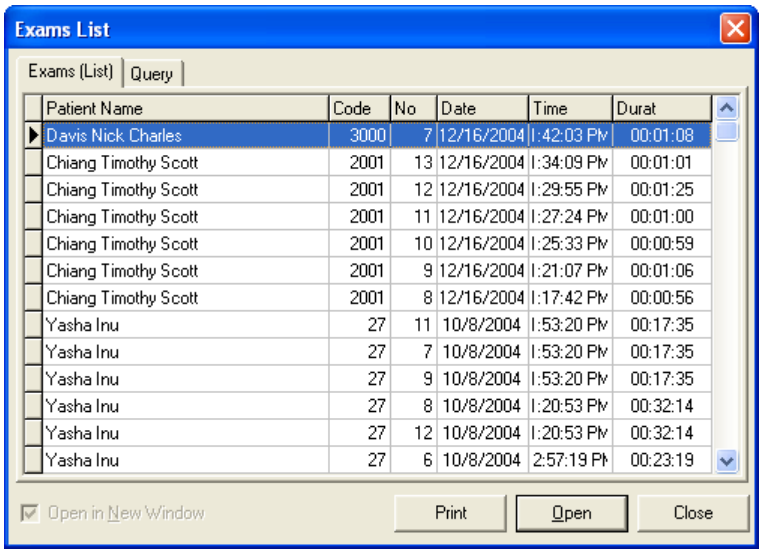


Figure 7-2. Select exams to export from the Exams List

Data Archive

Archiving exams saves computer space and ensures the safe storage of exam information and analysis.

Recording exams to the hard disk does not archive them. To archive exams, you must:

- Transfer the exams to an "archive disk" partition.
- Transfer the exams to a media support, such as an optical disk.

Neurotravel systems are shipped with all the software installed and configured for operation, including data archiving. The system disk is partitioned into three sections: C (operating system), D (Neurotravel Win), and E (archives). *Partitioning* divides the hard drive into isolated sections. (For information about archiving disks, see "Archive Disk" on page 228.)

Note: If your system disk is not partitioned into the aforementioned sections, please contact EGI Support (see Appendix A).

When archiving exams, store the exams in the E section before transferring them to a media support such as an optical disk (see “Archive Disk” on page 228).

Archiving Steps

Before archiving, verify that the data are ready and will be archived to the correct location:

1 Choose **EEG > List** to open the Exams List, select an exam and right-click, and choose View Exam Info from the resulting pop-up menu (Figure 7-3).

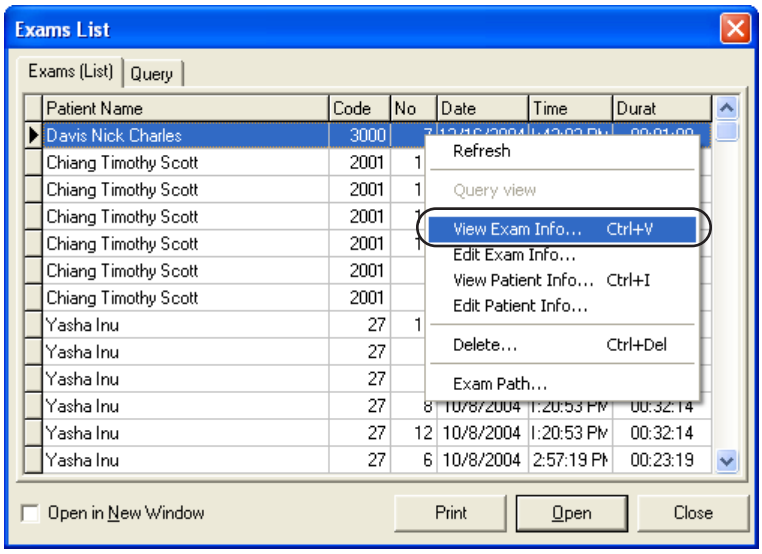


Figure 7-3. View the information for a selected exam in the Exams List

2 In the Exam (View) window, verify that the exams you want to archive have been reviewed and signed-off by the physician (for more information, see “Exam Reports” on page 172).

3 Choose **Options > System** to open the System Configuration dialog (Figure 7-4). In the Common pane, verify that E is the archive disk partition and click OK. If E is not the archive disk, click the arrow button next to the Archive disk box to open a list of available disks, choose E, and click OK.

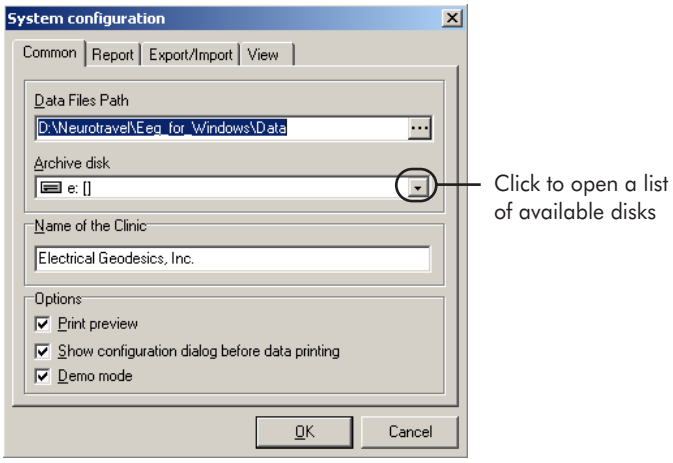


Figure 7-4. View the information for a selected exam in the Exams List

Now, you can start archiving:

1 Choose **Operations > Data Archive** to open a list of exams (Figure 7-5).

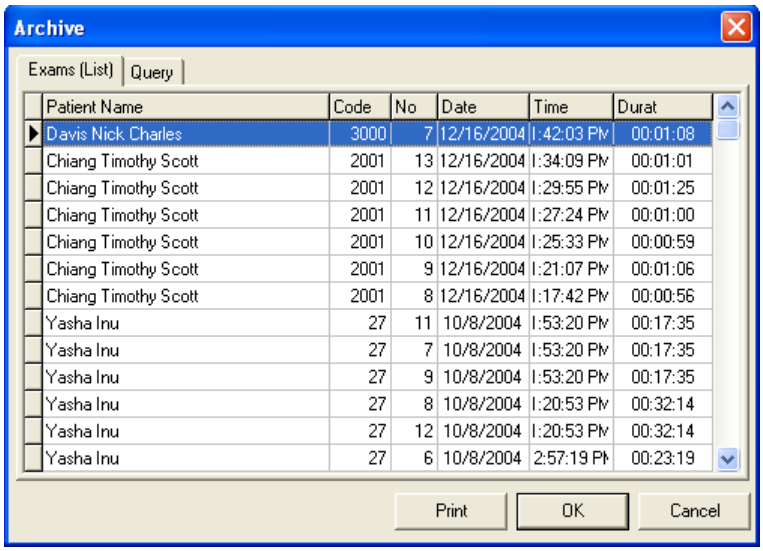


Figure 7-5. Select exams to archive

2 In the list, click or Control-click to select one or more exams to archive, and click the OK button.

Caution!: *Once an exam has been transferred to the archive disk partition, it cannot be edited or deleted from within Neurotravel Win. Contact EGI Support for help, if needed (Appendix A).*

3 A window appears, displaying the archiving disk label generated, the remaining archiving capacity, and the size of the currently archived disks (Figure 7-6); click OK.

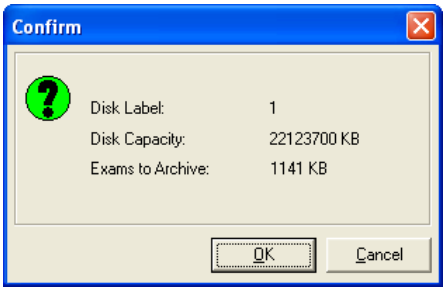


Figure 7-6. Information window for the first archiving disk

4 After a message confirming the completion of the operation appears (Figure 7-7), click OK and continue archiving until a message appears notifying you that the disk is full.

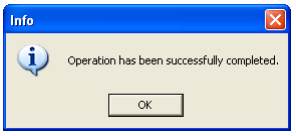


Figure 7-7. Successful archive

5 Choose **EEG > Archive List** to open the Archive Exams List window (Figure 7-8), which shows the exams that have been transferred to the archive disk partition; you can open and review these exams and their traces, if desired.

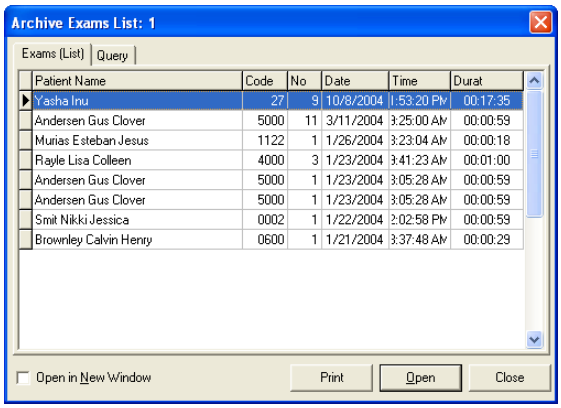


Figure 7-8. Archive List

6 Choose **Options > System Info** to open the System Info window; the Archive section displays the label of the archive disk partition (Figure 7-9).

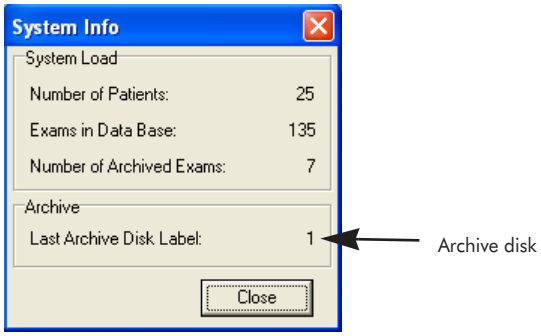


Figure 7-9. Archive disk label

7 Copy the entire contents of the archive disk partition (that is, the E section) to a storage media, such as a DVD-RAM disk, and name the disk according to the archive disk label provided in the System Info window.

8 If the archiving path is correct and the correct files have been archived, erase the data in the archive disk partition, to prepare for the next archiving session.

9 Before generating the next archiving disk, choose **Options > System** to open the System Configuration dialog and verify that the E section is the archive disk partition; the system will automatically number the next archive disk sequentially (Figure 7-10).

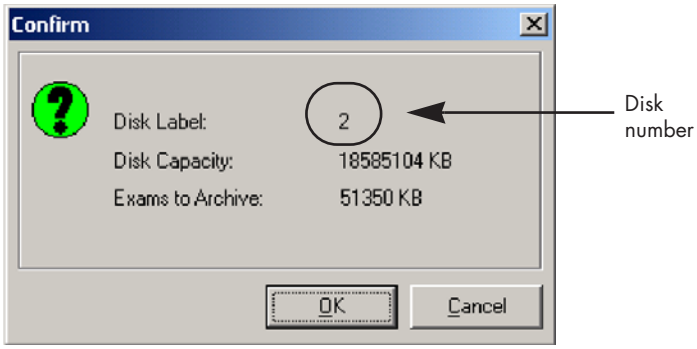


Figure 7-10. Information window for the second disk of archived exams

10 Keep all storage media in the proper environment and name them according to the archive disk labels assigned by Neurotravel.

Exam Deletion

The Delete Exam function erases exams that are saved to the acquisition disk, but have not yet been transferred to the archive disk partition. Archived exams cannot be deleted or edited.

There are two ways to delete exams: from within an exam, or from the Exams List. With the former, you can delete only one exam at a time; the latter enables you to delete a selection of exams.

To delete a current exam:

1 Open the exam so that it is the current exam displayed in the trace area.

2 Choose **Operations > Delete Exam**.

3 A dialog appears, requesting confirmation of the exam deletion; click Yes (Figure 7-11).

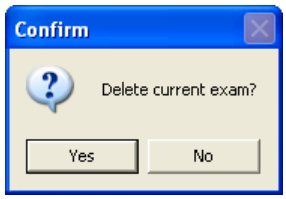


Figure 7-11. Confirmation dialog

To delete an exam using the Exams List:

1 Choose **EEG > List** to open the Exams List.

2 Click on an exam to select it from the list. (To select multiple items, Control-click on the exams.)

3 Right-click on the selection and choose Delete from the resulting pop-up menu (Figure 7-12).

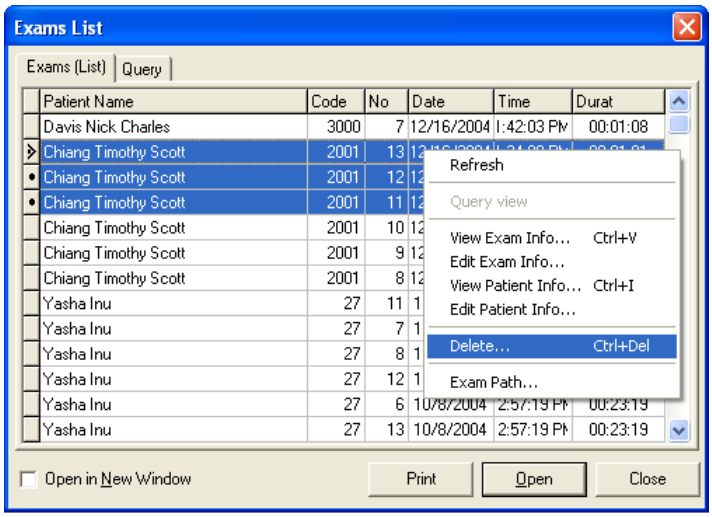


Figure 7-12. Deleting multiple exams

(To delete the selection using the keyboard, press Control-Delete.)

4 In the confirmation dialog that appears (see Figure 7-11), click Yes to confirm the deletion and close the window.

Search and Delete

If you have exams from a specific period to delete but are unsure of their location, you can perform a search, by date and time.

1 Choose **EEG > List** to open the Exams List.

2 Click the Query tab.

3 In the Query pane (Figure 7-13), fill in the text boxes labeled "Exams from" and "to" and click the Search button.

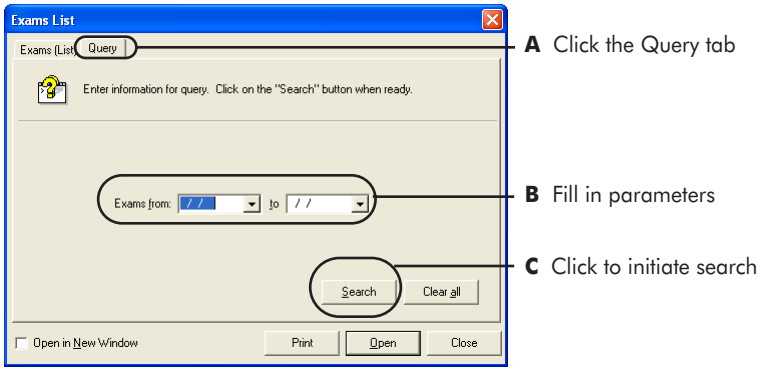


Figure 7-13. Query pane

4 From the list of all exams that meet the search criteria, right-click on the desired exams and choose Delete from the resulting pop-up menu (Figure 7-14).

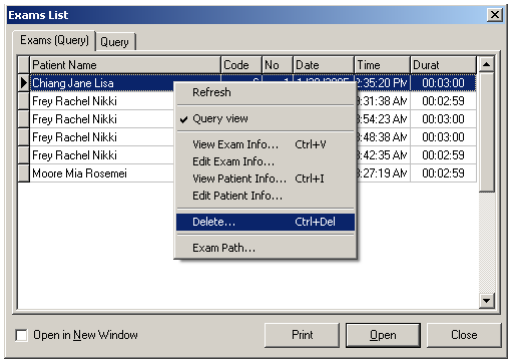


Figure 7-14. Query results

5 Click Yes to confirm the deletion and close the dialog.

chapter 8

Patient Menu

The patient database is the central component of the Neurotravel Win software. It is the repository of such confidential data as personal information, exams performed, exam results, medical history, and physician comments.

The Patient menu provides access to these data. This chapter describes how to create a new-patient record and how to view, print, or edit patient-related information.

Note: You can perform some of these functions using the database buttons in the control panels, described in Chapters 4 and 5.

When you select a patient in the Patient List (open by choosing **Patient > List**) and click OK, his or her name appears in the patient status bar, in the bottom-left of the review window (Figure 8-1).

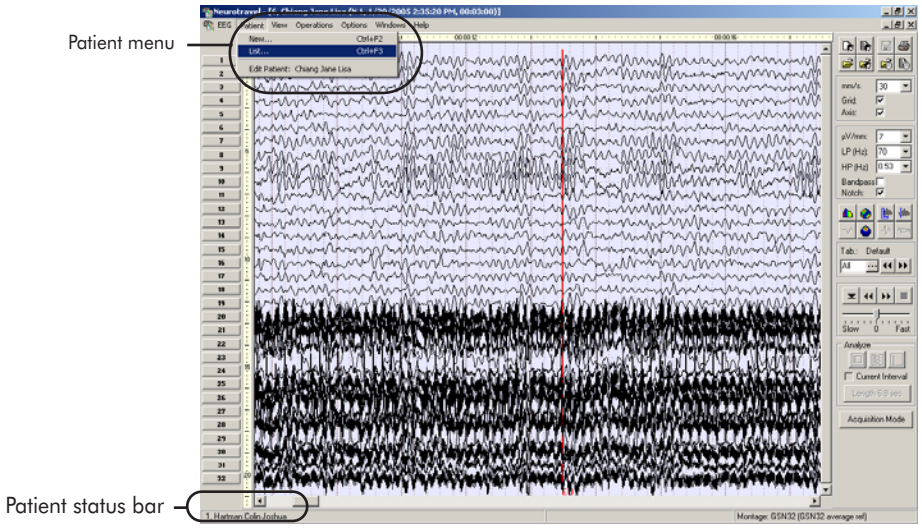


Figure 8-1. Patient status bar

If a patient record is designated inactive and has ***no*** archived exams, you can choose to delete this patient record (discussed on page 176), to conserve database space. Deleting a patient from the database will automatically delete all the patient's exams from the acquisition disk.

Note: Contact EGI Support (Appendix A) about deleting the patient record of someone who has archived exams.

The Patient Record

The patient record contains all the information needed to identify a patient. The record consists of six panes: Info, State, Additional Info, Notes, Exams, and Misc. Data (Figure 8-2). Each pane is described in this section.

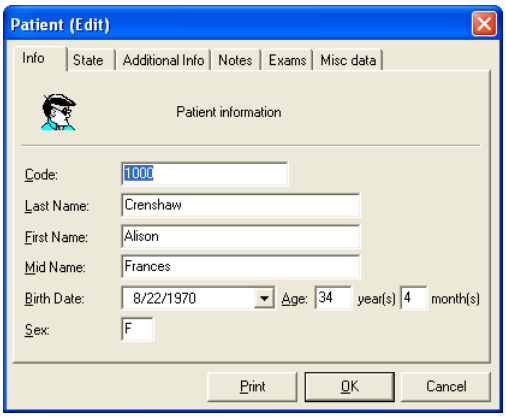


Figure 8-2. Patient record with six tabs

Info Pane

Figure 8-2 shows the Info pane, which provides general information identifying the patient. Following are brief descriptions of each of the pane's data fields:

- *Code*: an automatically assigned alphanumeric code identifying the patient (note that this field is editable and case-sensitive, and that duplicate codes are rejected, if you type in a new code)
- *Last Name*: patient's last name
- *First Name*: patient's first name

- *Mid Name*: patient's middle name
- *Birth Date*: day/month/year of birth, as selected by pop-up menus
- *Age*: patient's age, in years and months
- *Sex*: gender

Note: The minimum required data for a patient record is the code.

State Pane

Figure 8-3 shows the State pane, which contains the general vital statistics of the patient.

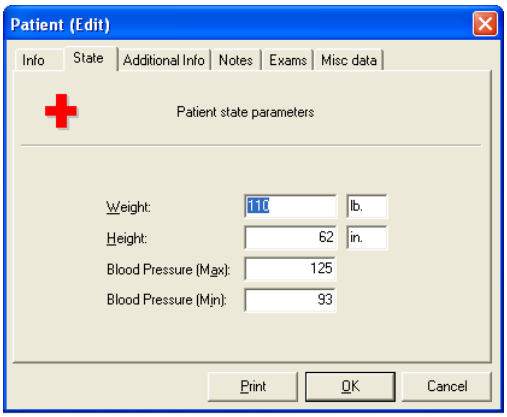


Figure 8-3. State pane

Following are brief descriptions of each of the pane's data fields:

- *Weight*: weight of the patient (first field for numerical value, and second for unit of measure)
- *Height*: height of the patient (first field for numerical value, and second for unit of measure)
- *Blood Pressure (Max)*: systolic blood pressure of the patient
- *Blood Pressure (Min)*: diastolic blood pressure of the patient

Additional Info Pane

Figure 8-4 shows the Additional Info pane, which contains contact information for the patient.

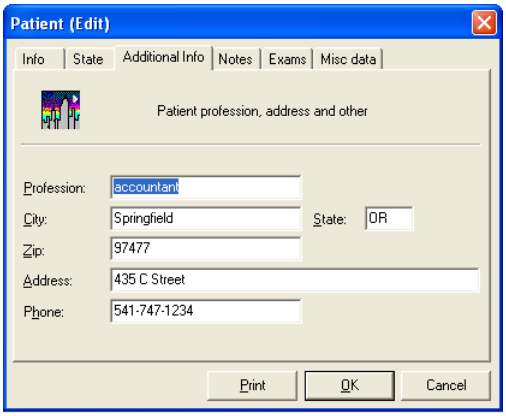


Figure 8-4. Additional Info pane

Following are brief descriptions of each of the pane's data fields:

- *Profession*: patient's occupation
- *City*: city where the patient lives
- *State*: state where the patient lives
- *Zip*: zip code of the patient's address
- *Address*: patient's address
- *Phone*: telephone number for the patient

Notes Pane

Figure 8-5 shows the Notes pane, which contains a text box for typing in notes about the patient.

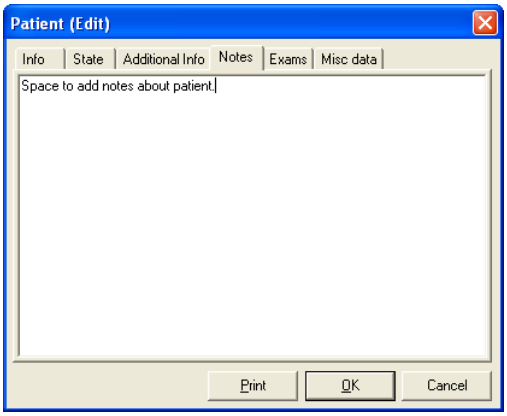


Figure 8-5. Notes pane

Exams Pane

Figure 8-6 shows the Exams pane, which contains a table of the recorded and archived exams of the patient.

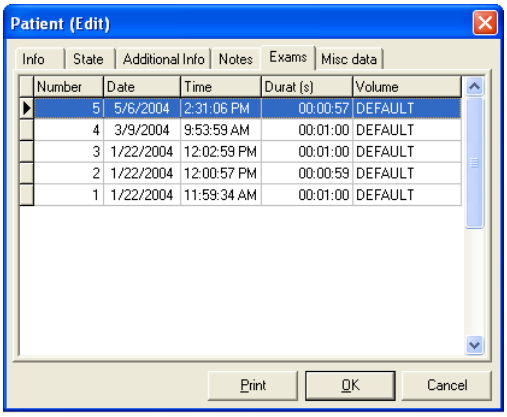


Figure 8-6. Exams pane

The table lists the patient exams, with information such as exam number; date, time, and duration of exam; and storage disk. You can right-click on the list to open a window that allows you to view or edit the exam info for a selected exam, open the exam (Figure 8-7, left), delete the exam, or view the file path (Figure 8-7, right).

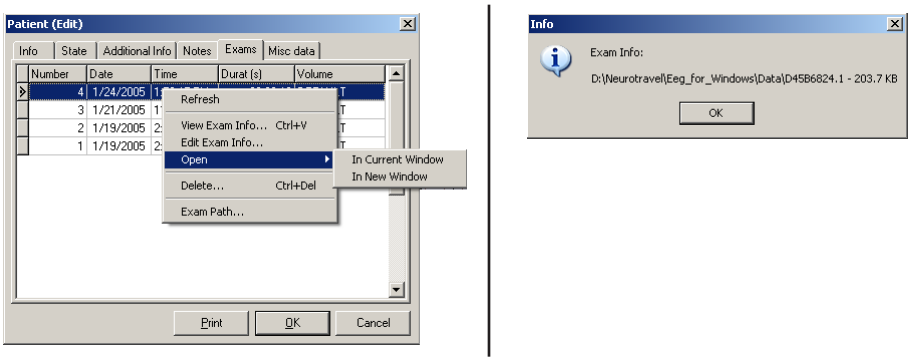


Figure 8-7. Open options (left) and exam path (right)

Misc. Data Pane

Figure 8-8 shows the Misc. Data pane, which contains patient-related information that does not fit in any of the other categories.

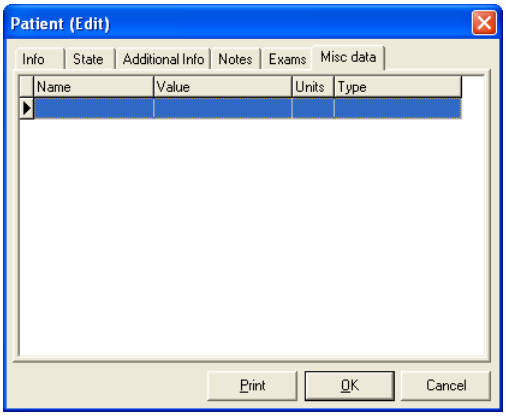


Figure 8-8. Misc. Data pane

This pane consists of a table with the following columns, not all of which must be filled in:

- *Name*: name of the information or document
- *Value*: alphanumeric value associated with the information
- *Units*: measurement unit associated with the value
- *Type*: type of information

New Miscellaneous Data

To create a new data category, right-click in the pane and choose New (or press the Insert key), which opens the Misc. Data (New) window. This window consists of three panes: Parameters, Document, and Add Data.

The Parameters pane contains name, type, value, and units fields.

The Document and Add Data panes are usable only if Document or File is chosen from the Type pop-up menu in the Parameters pane (Figure 8-9).

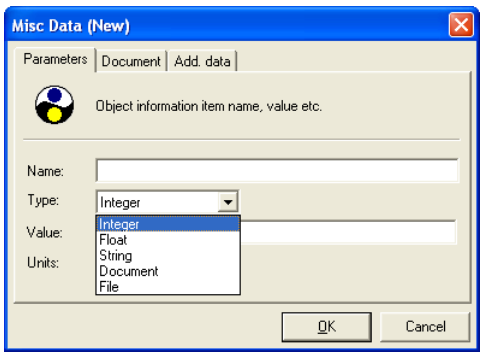
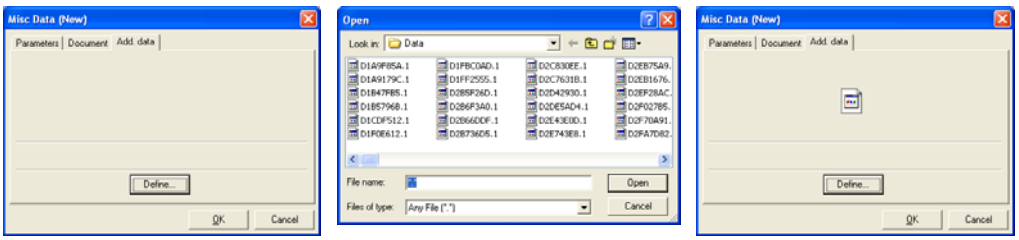


Figure 8-9. New miscellaneous information

If either is chosen, then the Define button in the corresponding pane becomes active, allowing you to attach a document or file to the current file (Figure 8-10).

If "File" is selected from the Type pop-up menu

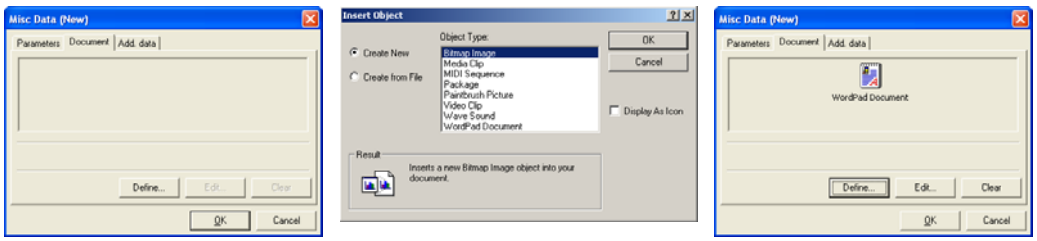


The Define button is active in the Add data pane. Click the button.

The Open dialog allows you to navigate to and select a file. Click Open.

The selected file is attached to the current file.

If "Document" is selected from the Type pop-up menu



The Define button is active in the Add data pane. Click the button.

The Insert Objects dialog allows you to select a document. Click OK.

The selected document is attached to the current file.

Figure 8-10. Attaching a file or document to the current file

Inserting a New Patient Record

To insert a new patient record:

1. Choose **Patient > New**.
2. Fill in the patient data fields described on page 162.
3. Click OK to accept the new-patient record, and notice that the new patient is automatically listed in the current patient status bar; click Cancel or press the Esc key to cancel the record.
4. Click the Print button in the patient record dialog, to print the new record.

Selecting a Patient Record

You can select an existing patient record from the database to view or modify the data, display the patient's exam list, or review the patient's traces. Select the patient record from the Patient List.

Patient List

Choose **Patient > List** to open this list. The Patient List window contains three panes: Patient (List), Query, and Exams (Figure 8-11).

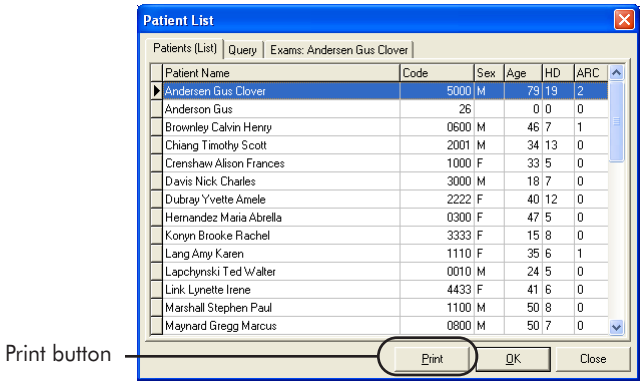


Figure 8-11. Patient List

- *List*: displays the patient records of all patients with recorded exams. Lists the patient records, and includes the patient name, patient code, gender, age, number of exams recorded to the hard drive, and number of exams archived to the archive disk.

- *Query*: allows you to search for a patient record by code, last name, first name, middle name, or exam date.

- *Exams:* lists the selected patient's recorded and archived exams, providing information such as exam number, date, time, duration, and storage disk. The exams of the patient selected in the Patient (List) tab are displayed.

Selecting a Record

To select a record using the mouse:

1. Choose **Patient > List**.
2. From the alphabetical list of patients, click to select a patient record and click OK, or double-click on the selected patient record.
3. The name of the selected patient is displayed in the patient status bar (see Figure 8-1 on page 161).

To select a record using the keyboard:

1. Press Alt, press the P key to open the Patient menu, and press the L key to open the Patient List.
2. Press the arrow keys to move the cursor through the list and select a patient.
3. Press the Enter key to choose a patient.

The Print button in the window enables you to print the entire list of patients in the database or a list of patients selected through a search.

Opening the Current Patient Exam List

The selected patient's name is automatically displayed in the current patient status bar. To review the current patient's exams, choose **EEG > Current Patient** to open the Current Patient Exam List window. This window contains two panes: Exams (List) and Query (Figure 8-12).

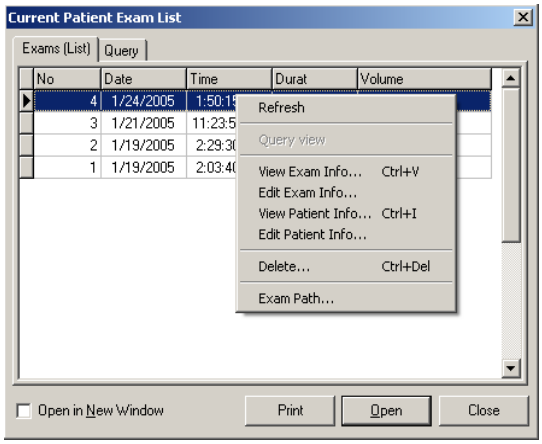


Figure 8-12. Current Patient Exam List

Exams (List) Pane

The Exams List is arranged by recording date. Scroll bars appear on the right border if the list is too long to display in its entirety. In this case, view the list items by using the mouse to drag the bars. You can also scroll through the list by pressing an arrow key.

The Exams (List) tab includes the following columns:

- *Number*: progressive number of patient's exam
- *Date*: recording date of exam
- *Time*: recording time of exam
- *Duration*: recording duration of exam
- *Volume*: disk on which the exam is stored. If the exam is still on the acquisition disk, this field will contain the default value. If the exam has been archived, the field will show the label of the optical disk where the exam is archived.

Query Pane

The Query pane allows you to search for an exam, by date. Fill in the "Exam from" and "to" text boxes, and click the Search button (Figure 8-13).

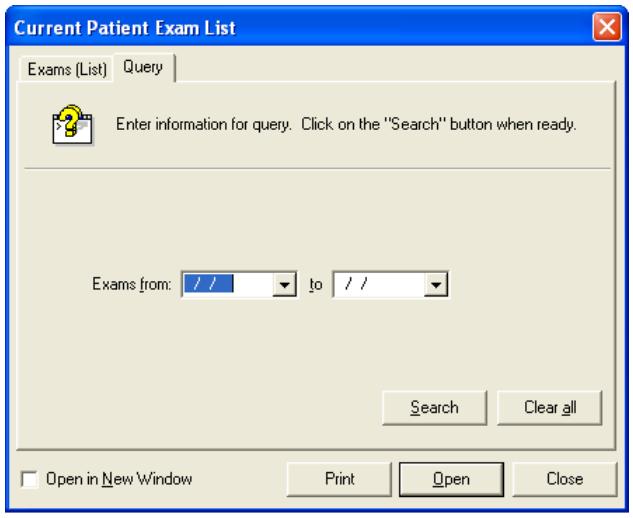


Figure 8-13. Query pane

Exam Reports

From the Current Patient Exam List window, you can select a specific exam, view additional information about the exam, or create and print an exam report.

1. In the Current Patient Exam List window, click on an exam to select it.

2. Right-click and choose View Exam Info from the resulting pop-up menu; this opens a window containing select exam information. The information is grouped by tabs: information, personnel, history, annotation, interpretation, and miscellaneous data (Figure 8-14):

   - *Info*: general vital statistics of the patient, including weight, height, blood pressure (maximum and minimum), medications, and other notes
   - *Personnel*: patient's physician, and technician who recorded the exam
   - *History*: text box for entering information about the patient's medical history
   - *Annotation*: notes related to the exam
   - *Interpretation*: exam interpretation

- *Misc. Data*: supplemental patient information (for more information, see "Misc. Data" on page 166), with columns for name, value, units, and type

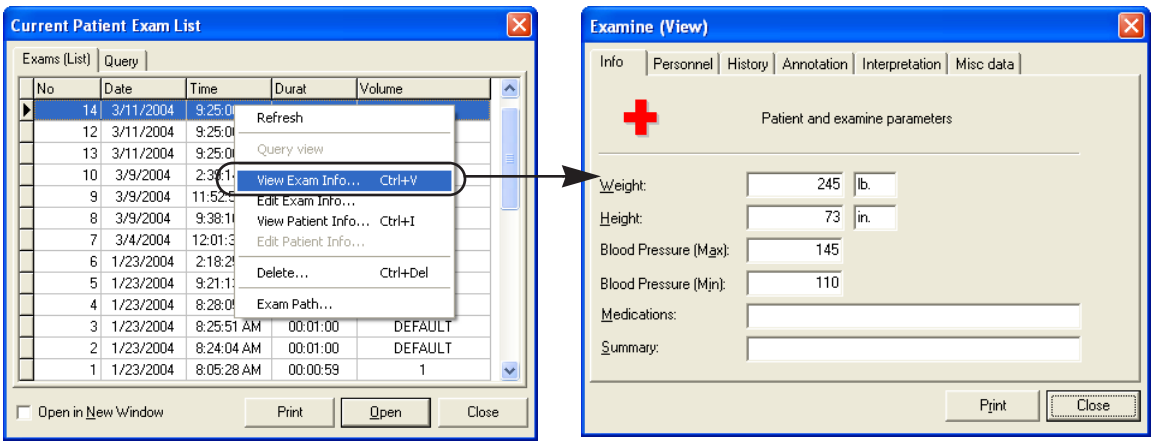


Figure 8-14. Viewing the current patient's exam

3 Click the Print button to produce a printout of the patient's private data, with history and report.

Creating Exam Reports

From the Current Patient Exam List window, you can also export the patient and exam data directly from the Neurotravel databases and into a word-processing program such as Microsoft Word 2003.

*Note: Neurotravel Win contains a report template in **D:\Neuroravel\ Eeg_for_Windows\ Support** that you can modify. If you want to create your own template in Word or another program, be sure to place the template in the **\Support** folder and that the external editor configuration is directed to it (see Figure 8-15 on page 174)*

To create an exam report:

1 Select and open the exam.

2 Choose **Options > System** to open the System Configuration dialog.

3 In the dialog, click the Export/Import tab and make sure that the correct directories are specified for both the export and import file paths.

4 In the dialog, click the Report tab, select the Use External Editor checkbox, choose the template for the report (Neurotravel provides an editable report template named "Template8" in **D:\Neurotravel\Eeg_for_Windows\Support**), and click OK (Figure 8-15).

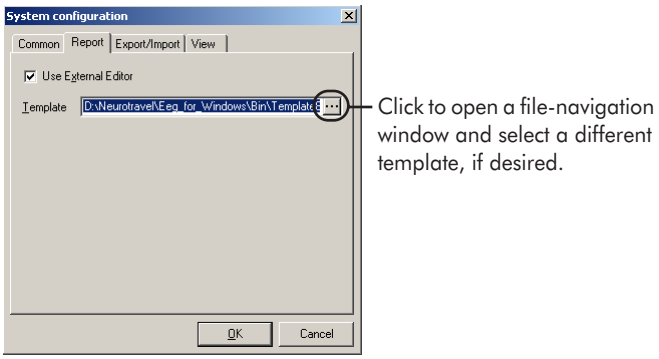


Figure 8-15. Check the external editor configuration

5 In the Review window, choose **Operations > Word Template** to initiate the data export to Word (Figure 8-16).

6 Close Microsoft Word; the document is now attached to the exam (the file will be saved in the exam report, and listed in the Misc. Data pane; described on page 166).

Figure 8-16. Template

Viewing Exam Reports

To view the exported report:

1 Choose **EEG > List** to open the Exams List.

2 Right-click on the exam in the Exams List and choose View Exam Info from the resulting pop-up menu.

3 In the Exam (View) dialog, click the Misc. Data tab.

4 In the Misc. Data pane, right-click on the exam and choose View File from the resulting pop-up menu.

Editing Patient Records

To edit patient data:

1. Follow the steps described in "Selecting a Record" on page 170, which makes the selected patient the current patient in the status bar.

2. Choose **Patient > Edit Current** to open the Patient (Edit) window, which contains the patient data fields and categories (described in "The Patient Record" on page 162).

3. Edit the patient data, as desired, and click OK to accept the changes.

Printing Patient Information

The Print button appears in a number of patient-related windows, allowing you to print a list of patients, information from a patient record, or data from a patient exam.

To print a patient list:

1. Choose **Patient > List.**

2. Click the Print button to produce a hard-copy list of all the patients in the database, with name, code, gender, age, and birthdate.

To print a patient record:

1. Choose **Patient > List**, right-click on a patient name, and choose View Patient from the resulting pop-up menu to open the Patient (View) window.

2. Click the Print button in that window to produce a hard copy of the information in the Info, State, Additional Info, and Notes panes of the patient record (see "The Patient Record" on page 162).

To print patient exam information:

1. Choose **Patient > List**, right-click on a patient name, and choose View Patient from the resulting pop-up menu to open the Patient (View) window.

2. In the Exams pane of that window, right-click on an exam and choose View Exam Info from the resulting pop-up menu to open the Exam (View) window.

3. Click the Print button in that window to produce a hard copy of the information in the Info, Personnel, History, Annotation, and Interpretation panes of the exam report (see "Exam Reports" on page 172).

Deleting Patient Records

Caution!: *Use great care when deleting patient records or exams because these operations are irreversible.*

Note: You can delete a patient record ***only*** *if none of his or her exams have been archived.*

To delete patient data:

1. Choose **Patient > List**.

2. From the alphabetical list of patients, click to select a patient record with no archived exams.

3 Right-click on the selected patient and choose Delete Patient from the resulting pop-up menu, which allows you to delete the patient's exams and private data from the databases (Figure 8-17).

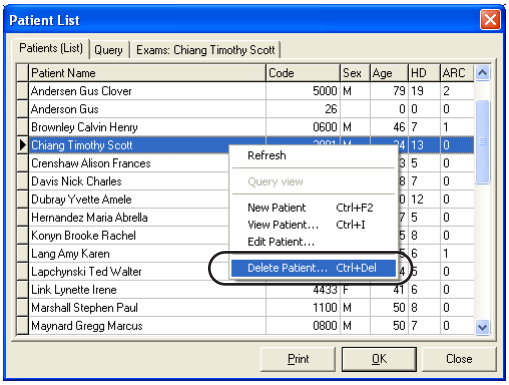


Figure 8-17. Deleting a patient record

4 In the confirmation window that appears, click Yes to accept the deletion.

To delete only specific exams from a patient record, and not the entire patient record:

1 Choose **Patient > List**.

2 From the alphabetical list of patients, click to select a patient record.

3 Click the Exams tab to display the exams for that patient (Figure 8-18).

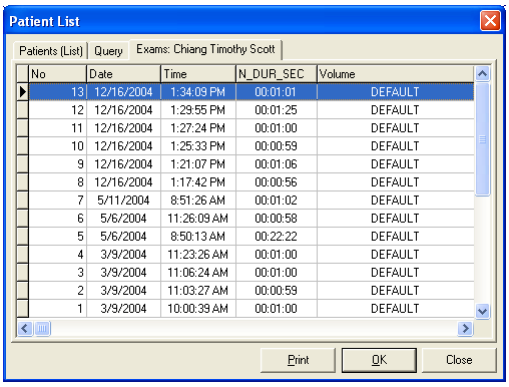


Figure 8-18. Opening the Current Patient Exams window

4 Select an exam in the Exams pane by clicking on it. (To select more than one exam, Control-click on the exams.)

5 Right-click in the selection and choose Delete from the resulting pop-up menu (Figure 8-19).

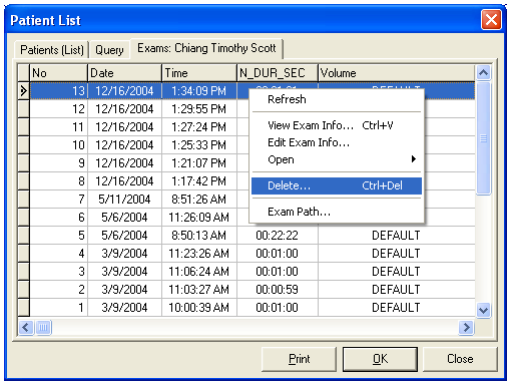


Figure 8-19. Choosing Delete

(To perform the same action using the keyboard, press Control-Delete.)

6 In the confirmation window that appears, click Yes to accept the deletion (Figure 8-20).

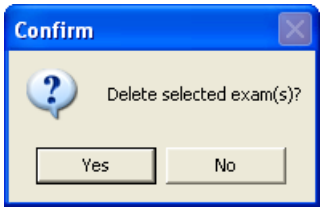


Figure 8-20. Confirming the deletion of the exam

chapter 9

Options Menu

The Options menu in the Neurotravel Win menu bar contains commands for configuring the setups for display, printer, acquisition parameters, recording time, events, montages, frequency bands, photostimulator, and other features described in this manual (Figure 9-1).

Figure 9-1. Options menu

Note: The EP Schemes feature is optional and not discussed in this manual.

It is best to configure the system setup and keep the settings consistent before acquiring data.

This chapter describes each of these settings:

- Display
- Print
- Filters
- Acquisition
- Record time
- Event
- Montage
- Frequency bands
- Photostimulator
- Hot keys
- System users
- System
- System info

Display Configuration

The first command in the Options menu is Display, which enables you to set up the display configuration.

Choose **Options > Display** to open the Display Configuration window.

The Display Configuration window consists of six tabbed panes, most pertaining to color-coding:

- *Parameters*: Sets display parameters that apply to both acquisition and review.
- *EEG*: Color-codes elements such as signal, marked EEG, markers, acquisition grid, and amplitude markers.
- *Markers*: Color-codes elements such as photostimulator marks, events, and recording breaks.
- *Resolution*: Specifies the display resolution.
- *Maps*: Color-codes distribution maps and scales.
- *Graphs*: Color-codes bands such as delta, theta, alpha, and beta.

The Display Configuration settings remain in effect for subsequent exams, unless changed. Each of the six panes is described in the following paragraphs.

Parameters Pane

Figure 9-2 shows the Parameters pane.

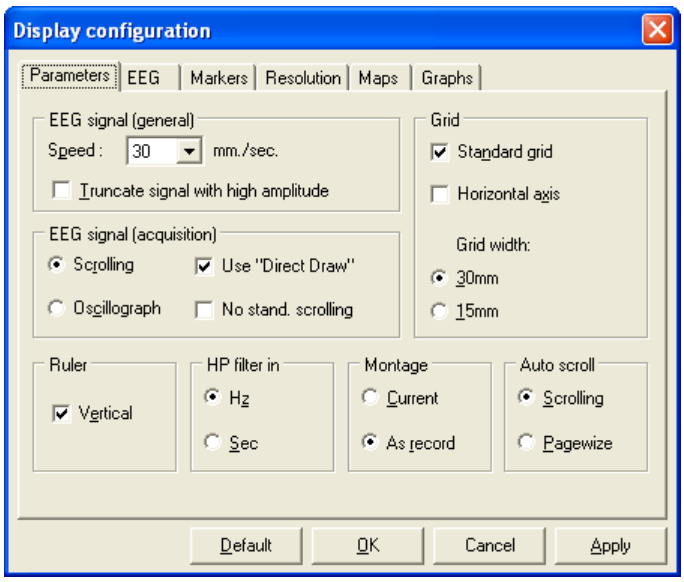


Figure 9-2. Display Configuration window

Following are brief descriptions of the controls in the Parameters pane:

- *Grid width*: Determines the width (15 or 30 millimeters) of a visible vertical background grid shown during trace display.
- *Horizontal grid*: Displays or hides horizontal lines in correspondence to the trace zero.
- *Truncating displayed signal*: Prevents or allows overlapping signals during data display.
- *Scrolling mode or oscillograph*: During acquisition, displays the signals in a continuous scroll or in an "oscillograph" style.
- *Ruler*: Displays a vertical ruler.
- *HP filter*: Provides the display and print values of the highpass filter frequency in Hertz or seconds.
- *Montage*: Allows you to visualize, in review mode, the data using the current review montage or another montage.
- *Auto scroll*: During review mode, scrolls the data in a continuous motion or "turns" them as pages.

EEG Pane

Figure 9-3 shows the EEG pane.

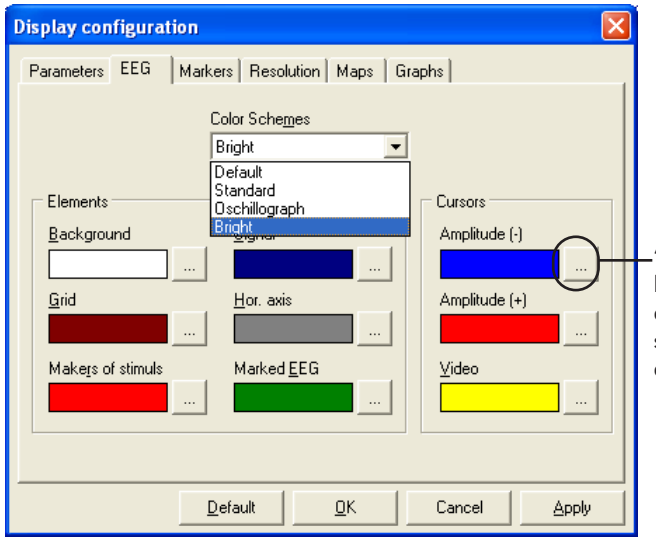


Figure 9-3. EEG pane

The EEG pane contains controls for color-coding elements in the trace area, including EEG signals, amplitude timepoints (see "Color Schemes" on page 124 for more information about amplitude timepoints), and video EEG markers. You can choose from the preset color schemes offered, or manually select a color for each element by clicking the "dotted" browse button.

Markers Pane

Figure 9-4 shows the Markers pane.

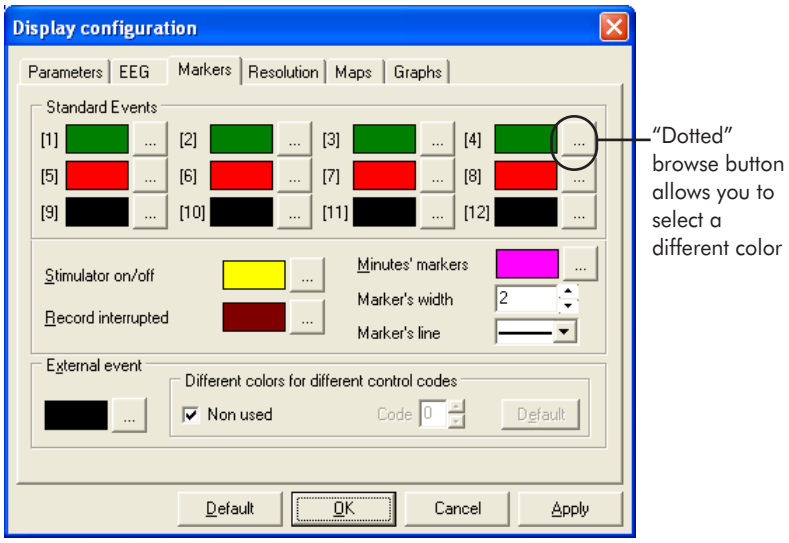


Figure 9-4. Markers pane

The Markers pane contains controls for color-coding elements associated with events, which is useful for event-related potential studies (to specify a color, click on the "dotted" browse button). You can define and order standard events, and link them to the current event table. The pane also allows you to change the line width and style of the markers. As many as 64 events can be color-coded.

Resolutions Pane

Figure 9-5 shows the Resolutions pane.

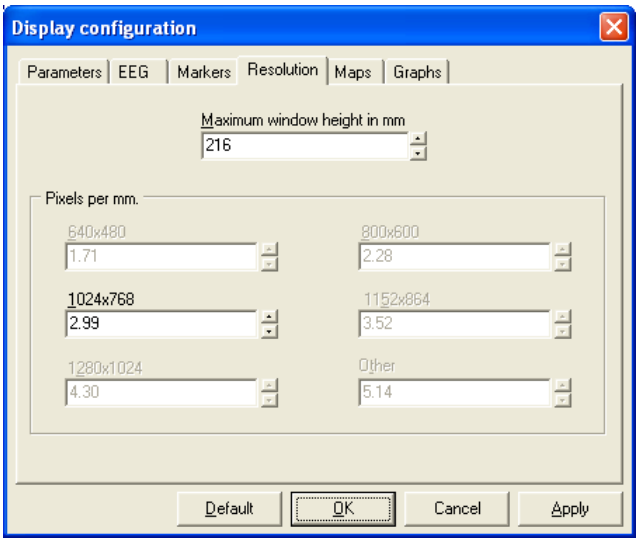


Figure 9-5. Resolutions pane

The Resolutions pane contains controls for specifying the maximum window height (in millimeters) and the pixel-per-millimeter resolution.

Maps Pane

Figure 9-6 shows the Maps pane.

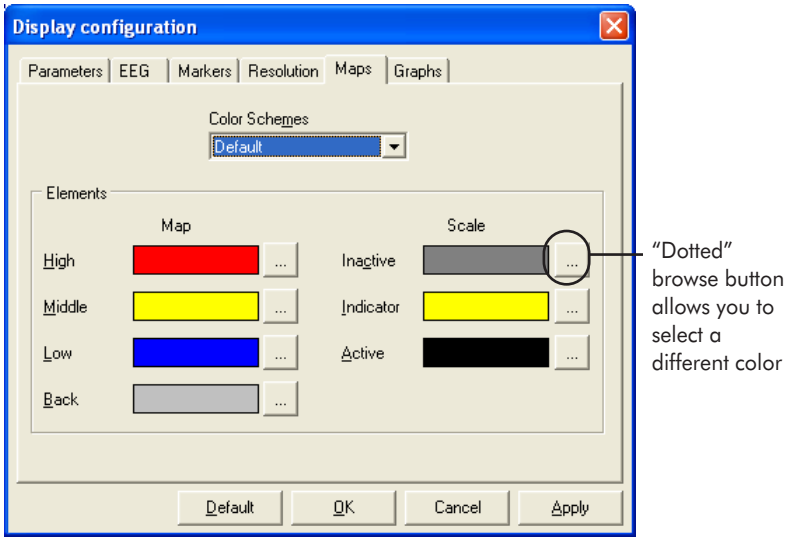


Figure 9-6. Maps pane

The Maps pane contains controls for color-coding elements in maps generated from the EEG data, such as amplitude maps or spectral brain maps (see "Amplitude Mapping" on page 123 and "Spectral Brain Mapping" on page 130 for more information). You can choose from the preset color schemes offered, or manually select a color for each element by clicking on the "dotted" browse button.

Graphs Pane

Figure 9-7 shows the Graphs pane.

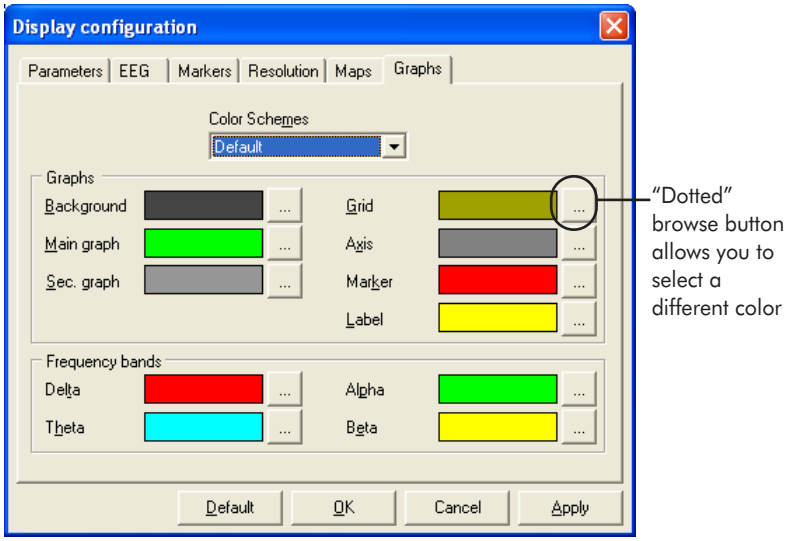


Figure 9-7. Graphs pane

The Graphs pane contains controls for color-coding graphs generated from the EEG data. You can specify the color for graphic elements representing frequency analysis and frequency bands (for example, see "Channel Spectrum" on page 138 and "Coherence Spectra" on page 146 for more information). You can choose from the preset color schemes offered, or manually select a color for each element by clicking on the "dotted" browse button.

Print Parameters

The second command in the Options menu is Print, which enables you to specify the print parameters.

Choose **Options > Print** to open the Print Parameters window (Figure 9-8).

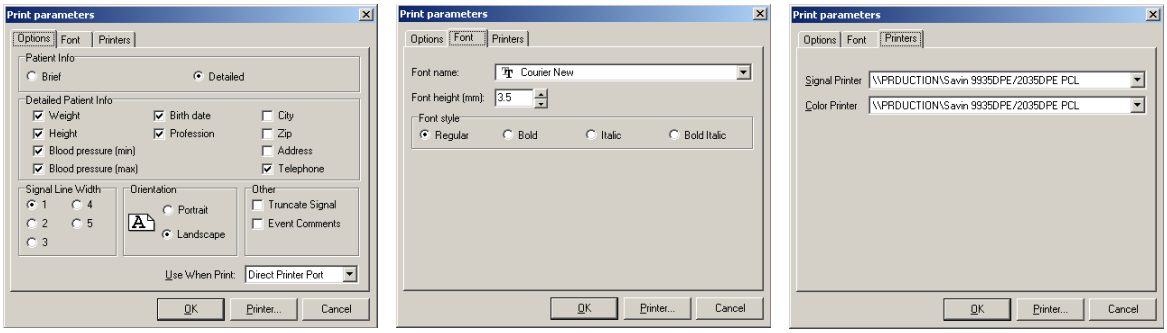


Figure 9-8. Print Parameters window (Options, Font, and Printers panes)

The Print Parameters window consists of three tabbed panes: Options, Font, and Printers.

- *Options*: In addition to print parameters such as page orientation, this pane allows you to specify what kind of patient information to include in the exam printout (weight, height, blood pressure). EEG-specific parameters include signal truncation and signal line width.
- *Font*: This pane allows you to specify the type, size, and style of font used in the printouts.
- *Printers*: This pane allows you to select a signal printer and a color printer.

Filter Configuration

The third command in the Options menu is Filters, which enables you to specify the filter configuration.

Choose **Options > Filters** to open the Filter Configuration window (Figure 9-9).

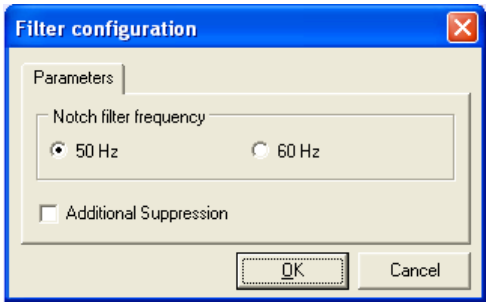


Figure 9-9. Filter Configuration window

The Filter Configuration window allows you to attenuate the noise coming from local power-supply lines. Choose 50 Hz or 60 Hz, depending on your country's main power frequency. In Europe, 50 Hz is the main power-supply frequency; in North America and other countries, the frequency is 60 Hz. (Japan is mixed; some regions use 50 Hz, others use 60 Hz.)

You apply the filter to an exam by selecting the Notch checkbox in the Acquisition and Review control panels.

Selecting the Additional Suppression checkbox causes the notch filter to behave like a high-range lowpass filter.

Figure 9-10 shows an example of the effect of a notch filter without (top line) and with (bottom line) additional suppression applied.

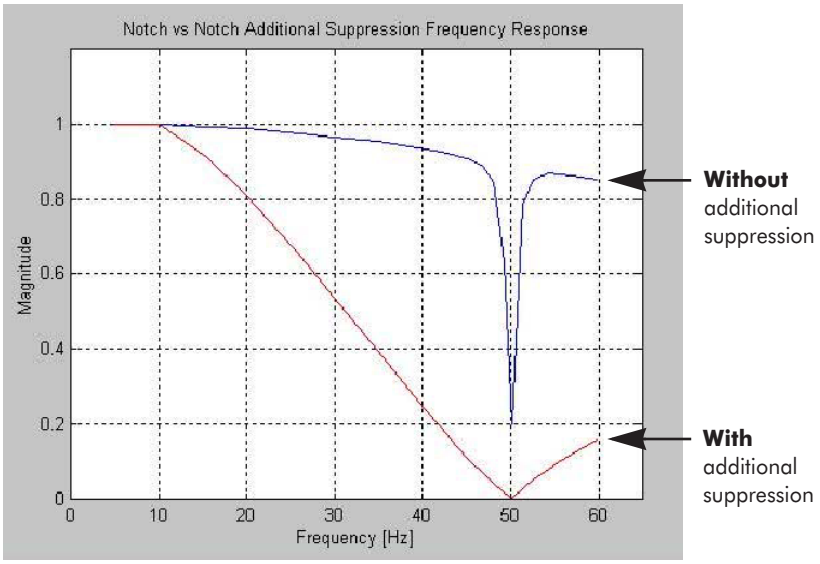


Figure 9-10. Additional suppression off (top line) or on (bottom line)

In an evoked-potential study, no additional suppression is necessary.

Data Acquisition Configuration

The fourth command in the Options menu is Acquisition, which enables you to specify the data-acquisition parameters.

Choose **Options > Acquisition** to open the Data Acquisition Configuration window. The Data Acquisition Configuration window consists of two tabbed panes: Parameters and Acquired Electrodes.

Parameters Pane

The Parameters pane (Figure 9-11) allows you to set the following values, used during acquisition:

- *Sample rate (points per second)*: Sets the EEG sampling rate. Only available rate is 250.
- *Calibration voltage (µV)*: Sets the amplitude of the test signal for the amplifiers and filters. Available voltages include 10, 50, 100, and 1,000.

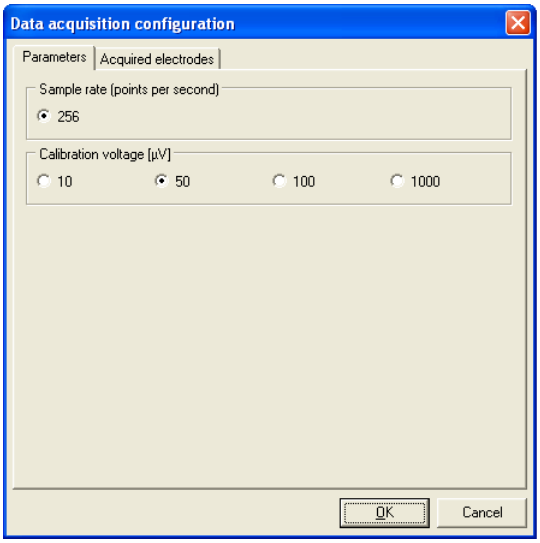


Figure 9-11. Parameters pane

Acquired Electrodes Pane

The Acquired Electrodes pane allows you to determine which electrode signals are *recorded*, which differs from the montage setting chosen in the Acquisition control panel.

Montage list button

The montage list button in the Acquisition control panel allows you to choose how the signals are *displayed*, not which ones are recorded. If you choose a montage that contains electrodes not selected in the Acquired Electrodes pane, a message appears

(Figure 9-12), the unselected channels are represented by flat lines in the trace area, and their channel tiles are dimmed (Figure 9-13).

Figure 9-12. "Not acquired" message

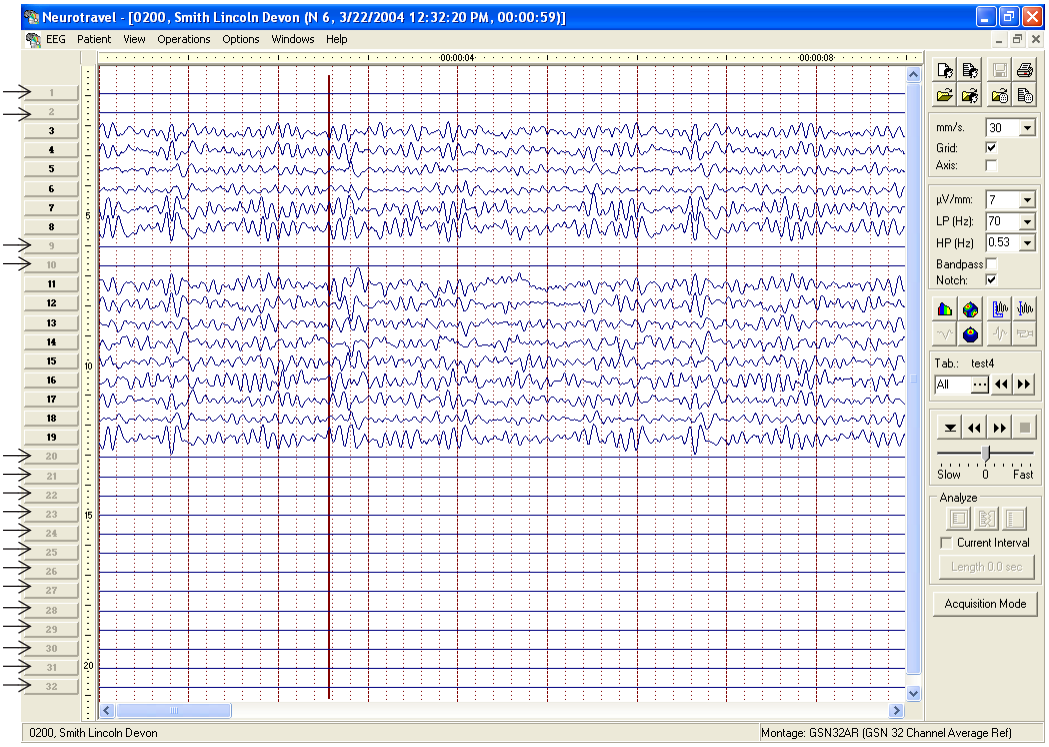


Figure 9-13. Unrecorded channels are represented by flat lines and dimmed tiles

(If you want to record these signals, click the As Montage button in the Acquired Electrodes pane; this is discussed further in the following sections.)

To choose which electrodes are recorded, click the Acquired Electrodes tab to view the Acquired Electrodes pane(Figure 9-14).

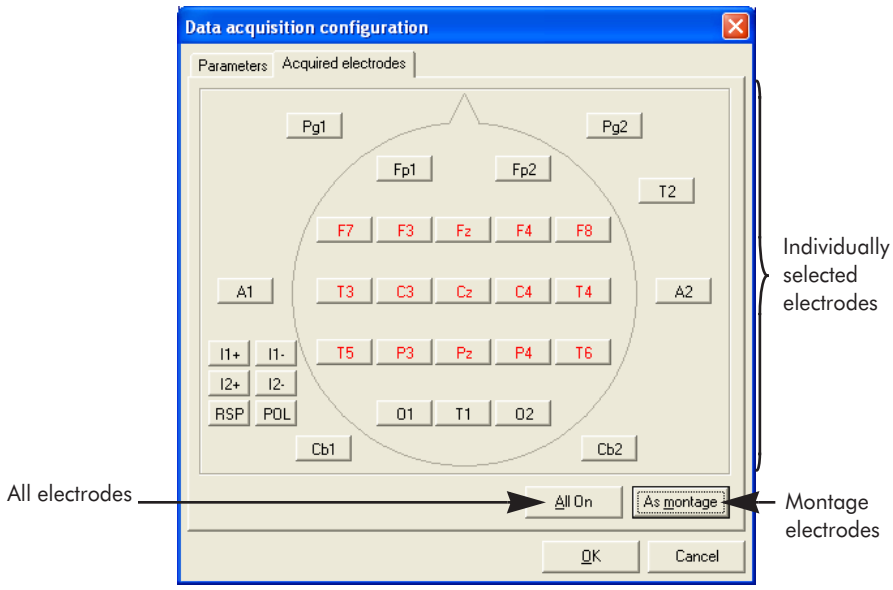


Figure 9-14. Acquired Electrodes pane

The Acquired Electrodes pane offers three options:

- *All On*: All electrode signals are recorded.
- *As Montage*: Only signals from the electrodes in the chosen montage are recorded.

  (For this option, first, select a montage using the montage list button in the Acquisition control panel; second, click the As Montage button in the Acquired Electrodes pane [the electrodes in that montage are then highlighted in red] and close the dialog; and third, begin acquiring and recording signals.)

Montage list button

- *Individually selected*: Only data from chosen electrodes are recorded.

  (For this option, just click on the desired electrodes in the Acquired Electrodes pane.)

The three options provide tradeoffs between available data and available hard-drive space.

Choosing All On allows all electrode data to be available during acquisition and review, but requires more memory on the hard drive. Choosing As Montage or individually selected electrodes records only specific electrode data, which uses less memory on the hard drive but prohibits all channels from being displayed during acquisition and review.

Record Time

The fifth command in the Options menu is Record Time, which enables you to specify the maximum duration of a recording.

Choose **Options > Record Time** to open the Record Time dialog (Figure 9-15).

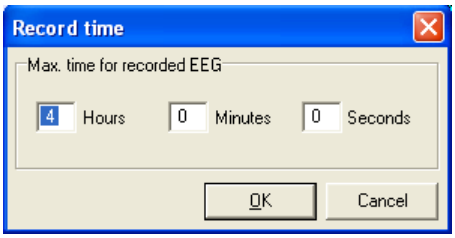


Figure 9-15. Record Time dialog

In the Record Time dialog, you set the maximum time value for a patient's recording session. After the recording time is set, the software checks the sampling rate (specified in the Data Acquisition Configuration window; see page 189) to determine whether there is enough room on the acquisition disk. When time elapses, recording automatically stops.

Event Command

The sixth command in the Options menu is Event, which enables you to define events for inserting into the trace area during *recording* (you cannot insert events if you are only *acquiring* signals). The events are organized in sets called *event tables*.

Choose **Options > Event** to open the event pop-up menu (Figure 9-16).

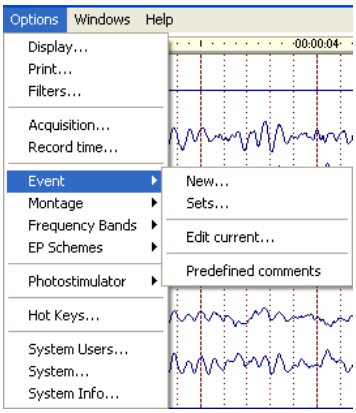


Figure 9-16. Event pop-up menu

The event pop-up menu enables you to create, select, or edit an event table to be used during EEG recording.

The event pop-up menu also enables you to create predefined comments, which you can insert into the trace as the data are being recorded. Events and comments are then codified and recorded in the trace to indicate the patient's status during the exam.

You can create one event table to codify a large number of events that you can insert into different exams. Or you can create an event table for each exam; the table used during recording is automatically used during review.

Creating an Event Table

Choose **Option > Event > New** to define a new event table in the Event Table dialog (Figure 9-17).

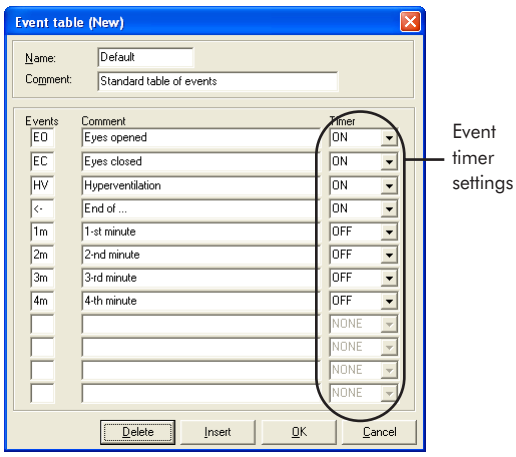


Figure 9-17. Event Table dialog

An *event table* is a defined set of events; events are defined by their two-letter names, expanded descriptions (called "comments"), and their timer settings.

In the Event Table dialog, define the events by filling in the Name and Comment text boxes and by typing in the desired definitions in the Events, Comment, and Timer columns.

The Timer column displays three options for each event: on, off, or none.

- If an event has the timer "on," each time that event is inserted into the trace, it resets the timer to 00:00.
- If the timer is "off," it stops the timer.
- If the timer is "none," it has no effect.

The event-timer settings, if properly configured, can help you monitor the times between significant events. For example, if a critical event's timer is "on," and no "off" event occurs afterward, then the event timer will display the time elapsed since the last clinically important event. Furthermore, if no "none" event occurs, the software automatically inserts markers every minute into the trace and into the Event List, to help you keep track of the time elapsed.

You do not need to fill in the table completely. Once satisfied, close the Event Table dialog.

Selecting an Event Table

Choose **Option > Event > Sets** to open the Event Sets window, for selecting an existing event table using the mouse or keyboard.

- Using the mouse, click to select an event table from the Event Sets window and click OK to choose the table.
- Using the keyboard, press the arrow keys to scroll through the Event Sets window and select an event table; press the Enter key to choose it.

Right-clicking anywhere in the Event Sets window opens a pop-up menu where you can create, view, edit, or delete the table from the database (Figure 9-18).

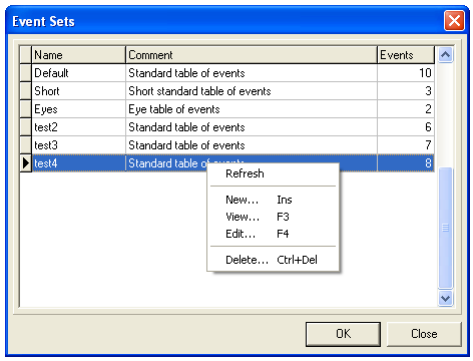


Figure 9-18. Modifying an event table

From the pop-up menu:

- If you select New, you can create an event table based on the default table.
- If you select View, you can only view, not edit, the selected table.
- If you select Edit, you can modify the selected table.
- If you select Delete, you can remove the selected table.

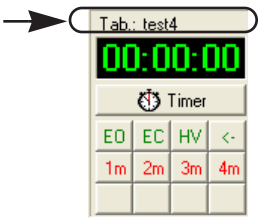


Figure 9-19. Event table indicator

Once you select an event table, it becomes the current one indicated at the top of the event table section in the Acquisition control panel (Figure 9-19).

Adding to an Event Table

When events occur that are not in the current event table, you can create new events during recording or review.

During recording, simply click in the traces area to open the Event Comment dialog, which enables you to insert a new comment.

During review, choose **Options > Event > Predefined comments** to open the Predefined Events' Comment dialog, where you can enter new comments (Figure 9-20).

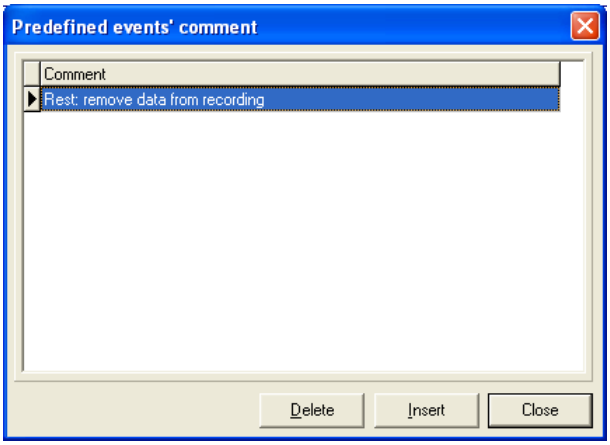


Figure 9-20. Adding an event comment

Montage Command

The seventh command in the Options menu is Montage, which enables you to define montages for use during acquisition or review.

Choose **Options > Montage** to open the montage pop-up menu (Figure 9-21).

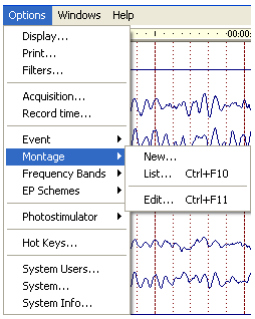


Figure 9-21. Montage pop-up menu

The montage pop-up menu enables you to create, select, or edit montages. You can use the keyboard to select some montage values, but it is better to use the mouse because of the variety of data you must enter.

Creating a Montage

Choose **Options > Montage > New** to define a new montage. The new montage window consists of five tabbed panes: Parameters, Channels, AV1, AV2, and AV3. Each is described in the following paragraphs.

Parameters Pane

Figure 9-22 shows the Parameters pane.

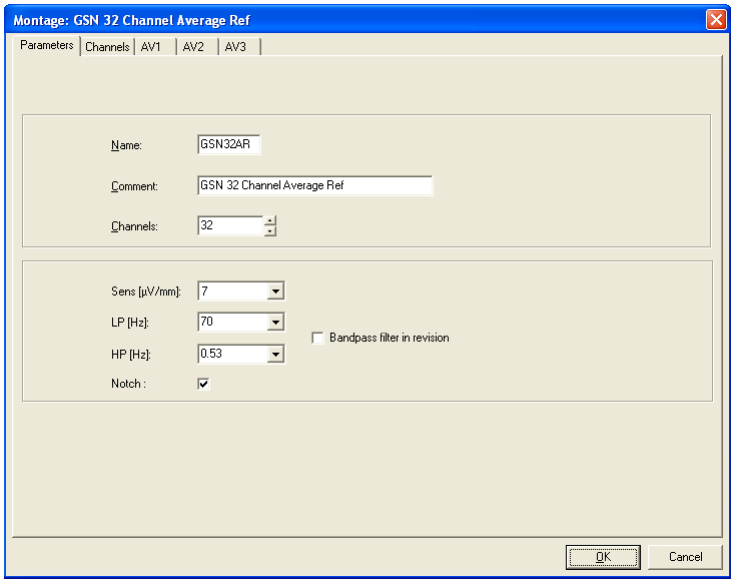


Figure 9-22. Parameters pane

The Parameters pane includes general information such as:

- *Name*: The montage name that appears in the database. Type the montage name and description in the Name text box.
- *Comment*: A brief descriptor of the montage.

- *Channels*: The number of channels set for the montage. Click the arrow buttons until you reach to the desired number (from 1 to 32); you cannot type the number into the text box.
- *Sensitivity*: The microvolts per millimeter value. You can select the sensitivity value from a pop-up menu or type in your own value.
- *Filter values*: The filter values for lowpass, highpass, and notch. You can select the lowpass or highpass filter values from a pop-up menu or type in your own value.
- *Notch*: Indicates whether a notch filter is or is not applied.
- *Bandpass filter in revision*: Applies a bandpass filter, which attenuates frequencies on either side of a band, allowing the band to pass unattenuated.

Channels Pane

Figure 9-23 shows the Channels pane.

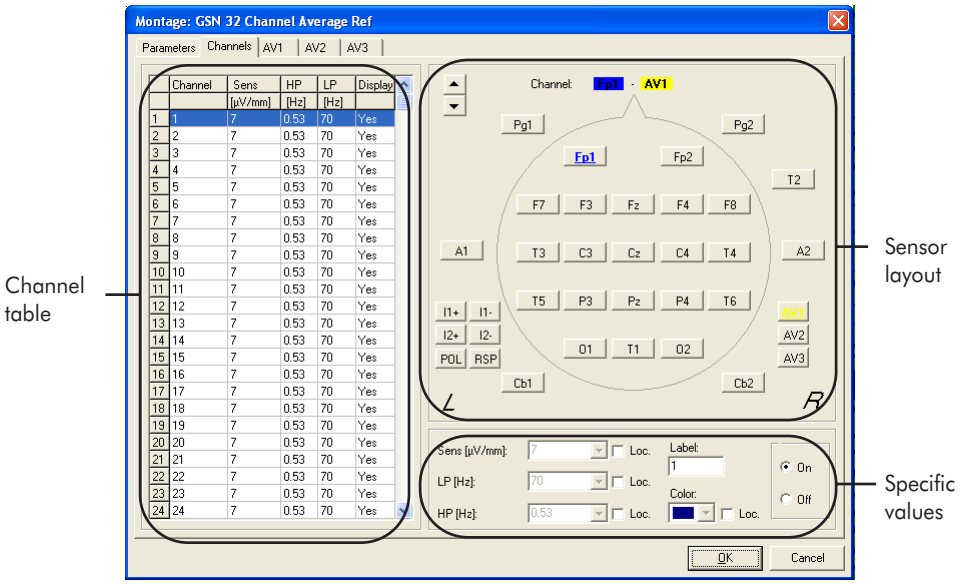


Figure 9-23. Channels pane

The Channels pane consists of three sections: the channel table, sensor layout, and specific values.

- *Channel table*: The table lists each channel's name, sensitivity, highpass filter value, lowpass filter value, and display/hide status. These are global values and cannot be changed in the table; to change the values, use the sensor layout and specific-values sections (which are described in the following paragraphs).
- *Sensor layout*: When you select a channel in the channel table, the sensor layout to the right of the table highlights the sensor(s) for that channel with a bright color. You can click on different sensors(s), changing the sensors for a channel; the channel name automatically changes in the channel table. After choosing the sensor for recording, then choose the reference channel.
- *Specific values*: Below the sensor layout are the specific values controls (Figure 9-24). These controls enable you to set specific values for filtering and sensitivity, color, and display characteristics for individual channels selected in the channel table. Specific values are unaffected by the global values, which are defined in the Parameters pane.

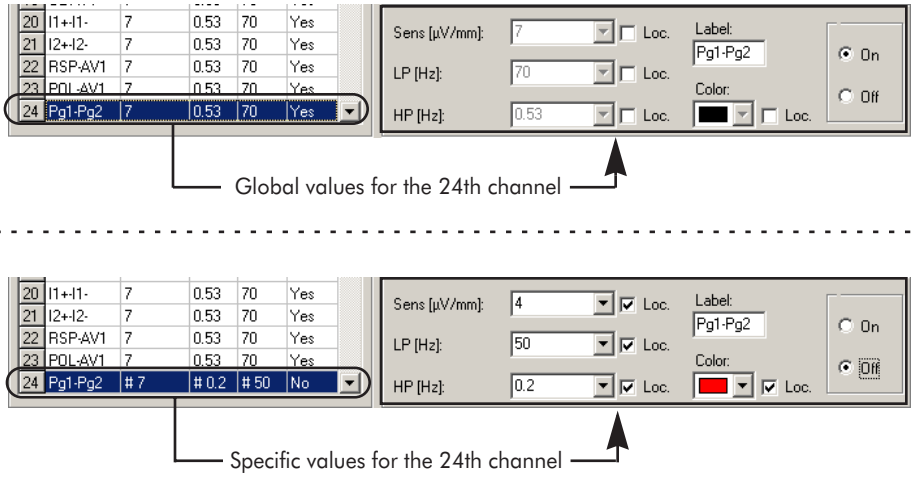


Figure 9-24. Specific values controls

To assign a specific value:

1 Select a channel from the channel table.

2 In the specific-values section, select a Loc checkbox ("Loc" stands for "local") and click on the "down arrow" next to the value, to open a pop-up menu.

3 Select a value from the pop-up menu or type in your own value (except for the color value, where you can only choose from the available options).

4 Define other specific values for that channel, if desired.

5 Choose whether the channel is displayed or not, by clicking the On or Off option button.

6 Apply specific values to other channels, if desired.

7 Click OK.

To revert to a default value, deselect the Loc checkbox.

AV1, AV2, and AV3 Panes

The AV1, AV2, and AV3 panes (Figures 9-25, 9-26, and 9-27) allow you to create three different average references by clicking on the desired sensor(s). When clicked, a sensor is highlighted with a bright color (red). To deselect a sensor as an average reference, click the sensor again and it reverts to its original color (black).

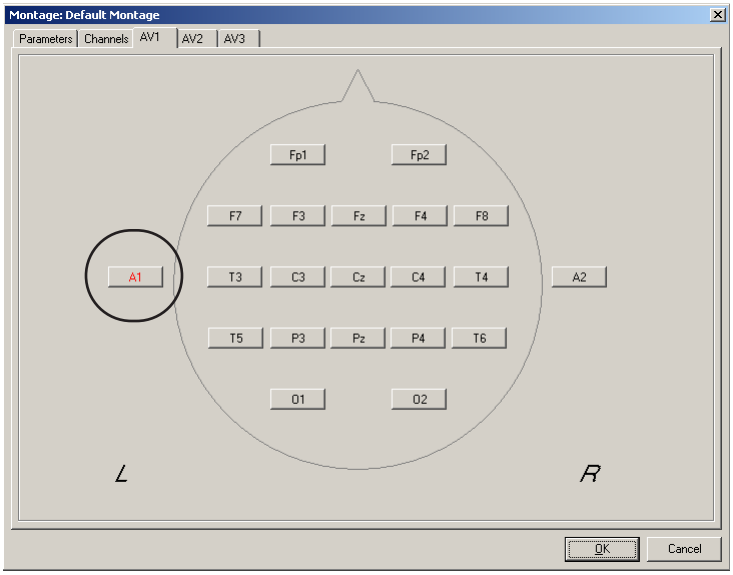


Figure 9-25. AV1 pane

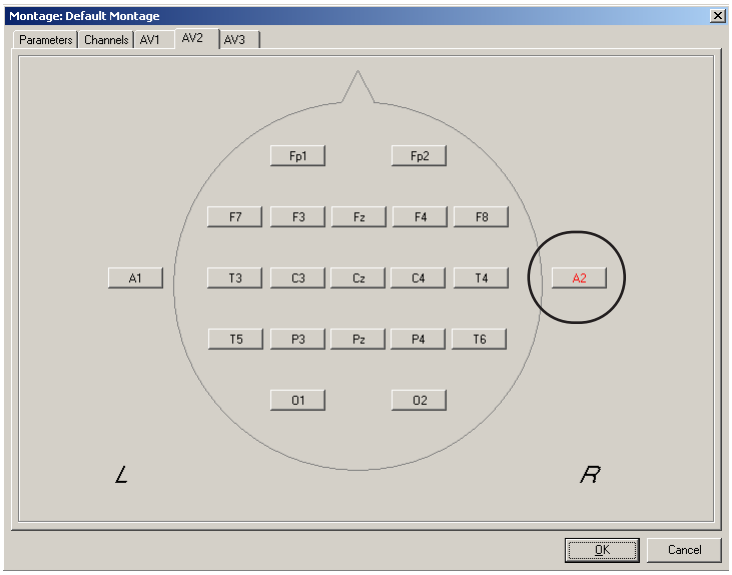


Figure 9-26. AV2 pane

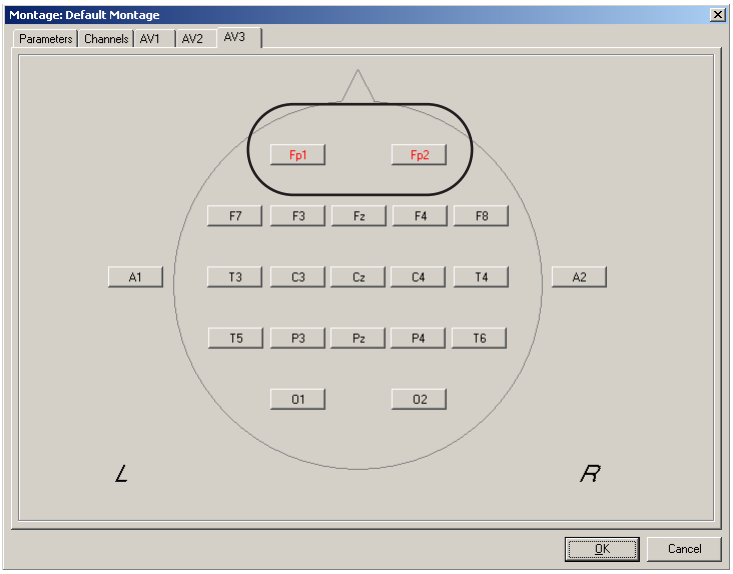


Figure 9-27. AV3 pane

Selecting a Montage

Choose **Options > Montage > List** to select one of the montages from the database, using either the mouse or the keyboard:

- Using the mouse, click in the montage name in the list and click OK.
- Using the keyboard, press the arrow keys to scroll through the montage list and select a montage; then press the Enter key.

Right-clicking on a selected montage in the montage list opens a pop-up menu where you can create, view, edit, or delete a montage from the database (Figure 9-28).

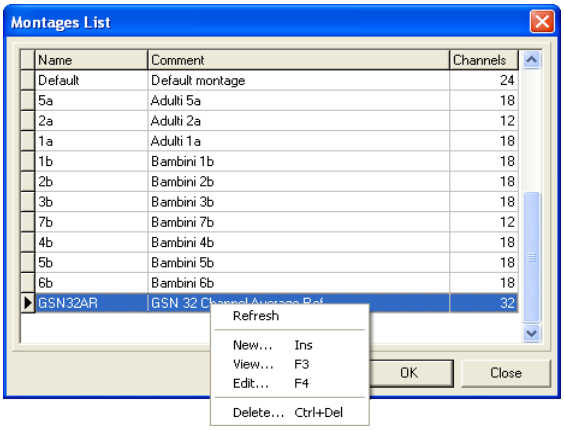


Figure 9-28. Modifying a montage

From the pop-up menu:

- If you select New, you can create a montage based on the default montage.
- If you select View, you can only view, not edit, the selected montage.
- If you select Edit, you can modify the selected montage.
- If you select Delete, you can remove the selected montage.

Once you select a montage, it becomes the current one, and its label appears in the montage status bar in the bottom right of the window (Figure 9-29).

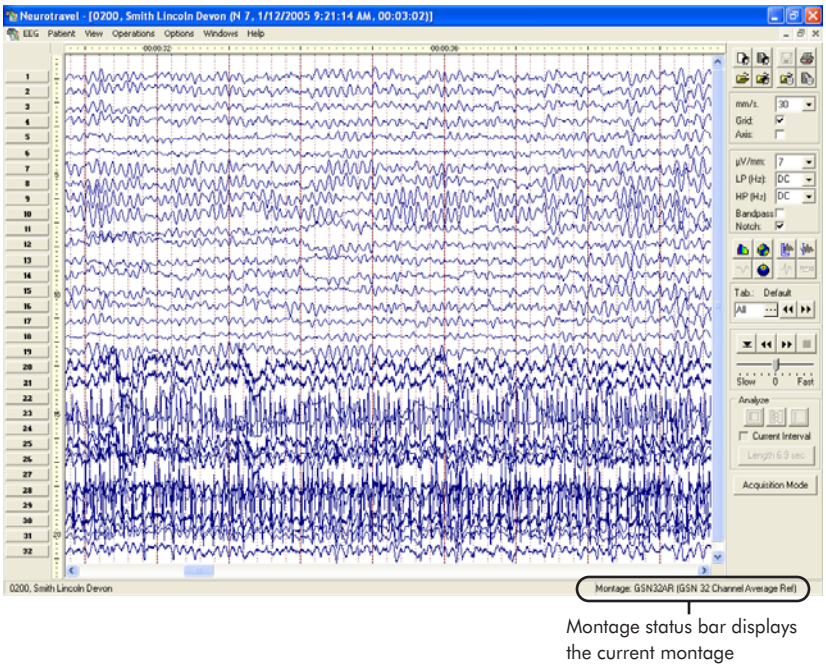


Figure 9-29. The current montage

Frequency Bands Command

The eighth command in the Options menu is Frequency Bands, which enables you to define frequency intervals for spectral maps.

Choose **Options > Frequency Bands** to open the frequency bands pop-up menu (Figure 9-30).

Use the frequency bands pop-up menu to create, select, edit, or delete frequency intervals on which to base your spectral maps.

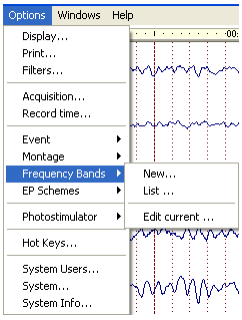


Figure 9-30. Frequency bands pop-up menu

Creating a Frequency Band Interval

Choose **Options > Frequency Bands > New** to open a window that enables you to define a new frequency interval for the display of your spectral maps.

The new frequency-bands window contains five fields (Figure 9-31).

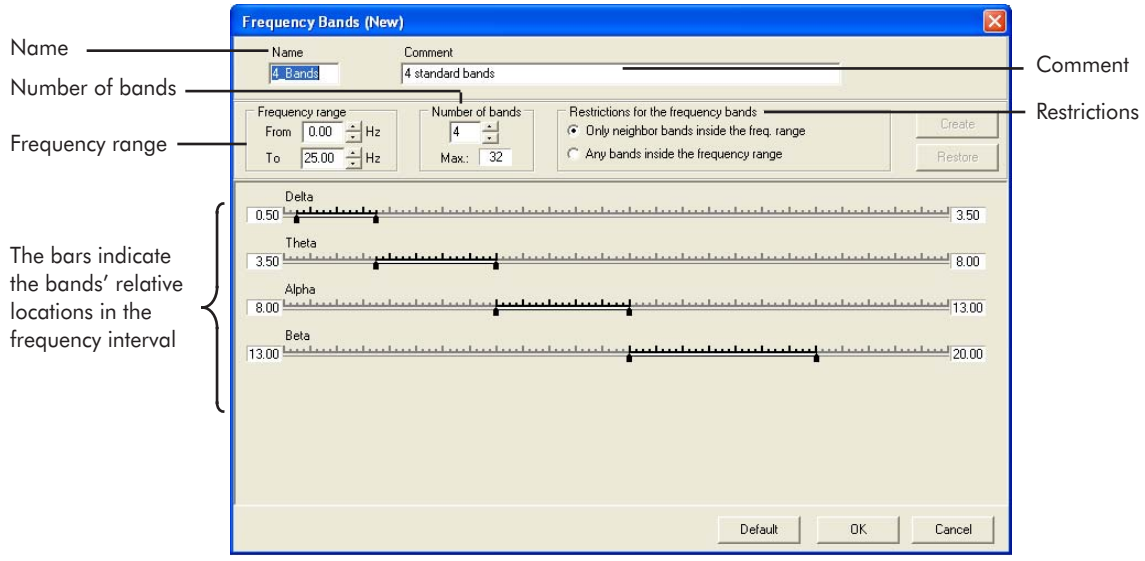


Figure 9-31. Frequency Bands dialog

- *Name*: name of the interval
- *Comment*: short description of the interval
- *Frequency range*: continuous intervals of the different bands
- *Number of bands*: number of bands inside the frequency interval
- *Restrictions for the frequency bands*: relationship between the different bands

The default for the new frequency-bands window is the standard four-band sequence (delta, theta, alpha, and beta) for classic analysis. The bottom of the window contains bars indicating the bands' relative locations in the frequency interval.

In general, to create a new interval, you specify the number of bands, define their relative locations by dragging the bars, rename the interval, and save it.

The 4-Bands settings serve only as a *template* for creating new intervals; in fact, in the new frequency-bands window, the software prevents you from overwriting the default interval or any other intervals already defined in the Neurotravel database (for a list of their names, choose **Options > Frequency Bands > List)**. (You can edit the

other intervals, using a *different* window that is opened by choosing **Options > Frequency Bands > Edit Current**; however, you *cannot* edit the default 4-Bands interval.)

Following are the specific steps to creating a new interval:

1. Specify the Number of bands.
   - If the number is 4, continue to the next step.
   - If the number is *not* "4," the lower part of the window becomes unavailable (Figure 9-32). You must click the Create button to make that portion available for editing again (depending on the number of bands specified, the Create function may automatically rename the interval using an existing name such as "5_Bands"; you must change the name in Step 4 before saving).

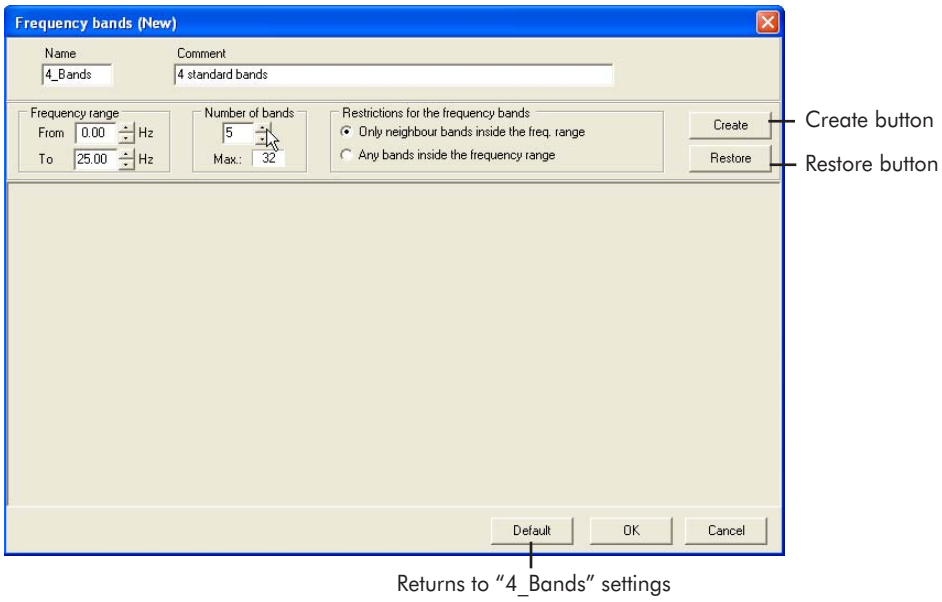


Figure 9-32. Frequency Bands window, with dimmed bottom section

2. To change a band frequency, click the edge of a band and drag. The minimum band frequency is 0.5 Hz (with a maximum of 32 active bands). The maximum band frequency is 30 Hz.

3. Fill in the Frequency range and Restriction fields.

4 Fill in the Name and Comment fields, ensuring that you select an unused name.

5 Once you have configured the setup parameters as desired, click OK to save the interval to the database.

Or if the parameters are unsatisfactory:

- Click Restore to revert the setup to its original configuration.
- Click Default to change to the default configuration.
- Click Cancel to dismiss the changes.

Selecting a Frequency Band Interval

Choose **Options > Frequency Bands > List** to view a list of intervals in the database. You can select an interval from the list, using the mouse or the keyboard.

- Using the mouse, left-click to select the frequency band interval from the list and click OK to choose it.
- Using the keyboard, press the arrow keys to scroll through the list and select a frequency band interval; press the Enter key to choose it.

Right-clicking opens a pop-up menu where you create, view, edit, or delete the selected frequency band interval (Figure 9-33).

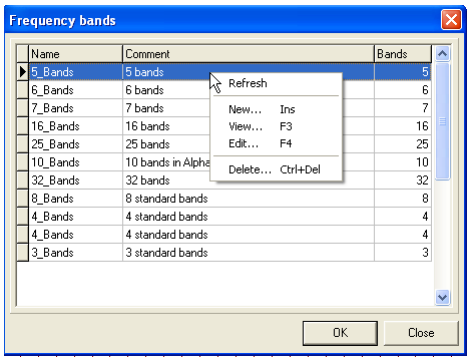


Figure 9-33. Modifying a frequency band epoch

With the pop-up menu:

- If you select New, you can create an interval based on the default interval.
- If you select View, you can only view, not edit, the selected interval.

- If you select Edit, you can modify the selected interval. (One exception is the default “4_Bands” interval, which cannot be edited.)
- If you select Delete, you can remove the selected interval. (One exception is the default “4_Bands” interval, which cannot be deleted.)

Once you select an interval, it becomes the current one.

Photostimulator Command

The ninth command in the Options menu is Photostimulator, which enables you to define automatic photostimulator protocols.

The photostimulator flashes a light at the patient at a frequency that evokes predictable brain activity. The photostimulator can work in manual or automatic mode during acquisition (Figure 9-34). Toggle the photostimulator mode button in the Acquisition control panel to select the mode.

In the manual mode, use the photostimulator buttons to turn the stimulator on or off and to modify the frequency (see “Photostimulator Controls” on page 86).

In automatic mode, the stimulator performs the photostimulation functions according to a protocol sequence stored in the database. This section describes the automatic photostimulator protocols.

Figure 9-34. Photostimulator controls set to manual (left) and automatic (right) mode

Creating a New Protocol

Choose **Options > Photostimulator > Protocols > New** to open a window to define a new protocol for managing the photostimulator (Figure 9-35).

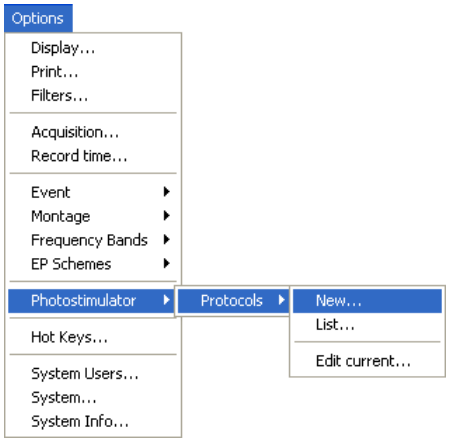


Figure 9-35. Photostimulator pop-up menu

Figure 9-36 shows the new photostimulator protocol window.

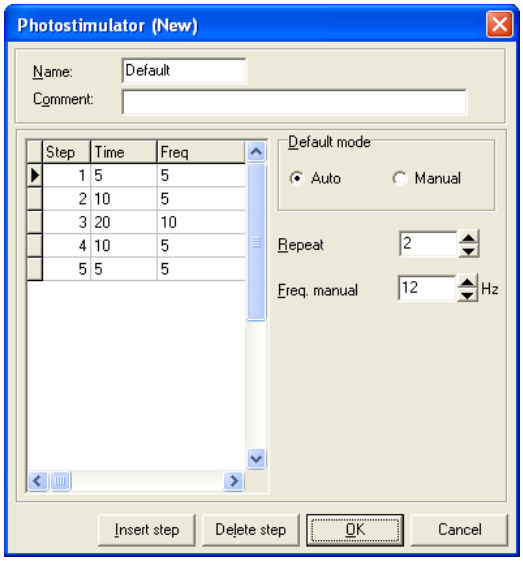


Figure 9-36. Creating a new photostimulator program

The new photostimulator protocol window contains five fields:

- *Name*: protocol name
- *Comment*: short description of the protocol
- *Step*: step number to define the protocol
- *Time*: protocol step time, expressed in seconds
- *Freq*: frequency, expressed in Hz, of the flashing of the photostimulator. The duration of time when the stimulator is not flashing equals the step time.

To create a sequence:

1. Enter a name in the Name text box.
2. Enter a brief descriptor in the Comment text box.
3. Select the program parameters at right:
   - *Default Mode section*: Specifies whether the photostimulator is in automatic or manual mode at startup.
   - *Repeat control*: Determines how many times the automatic photostimulation protocol is repeated.
   - *Frequency Manual selector*: Defines the initial photostimulator frequency used at startup, during manual operation.
4. Click in a row to select a protocol step.
5. Click the Insert Step button to add a row after the selected protocol step (or click the Delete Step button to delete the selected step).
6. After clicking the Insert Step button, click in the Time column to select it and click again to enter a value (or you can select a value from a pop-up menu that appears to the right; Figure 9-37).

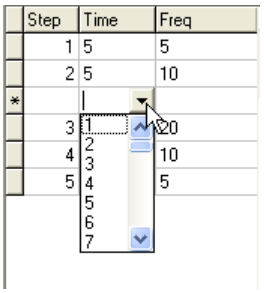


Figure 9-37. Specifying a new step

7 Click in the Frequency column to select it and click again to enter a value (or you can select a value from a pop-up menu that appears to the right).

8 Click OK, when finished creating the entire sequence.

Selecting a Protocol

Choose **Options > Photostimulator > Protocols > List** to view a list of protocols. You can select from the list using the mouse or the keyboard.

- Using the mouse, click to select the protocol from the list and click OK to choose it.
- Using the keyboard, press the arrow keys to scroll through the list and select a protocol; press the Enter key to choose it.

Right-clicking on a protocol name opens a pop-up menu where you can create, view, edit, or delete the selected protocol (Figure 9-38).

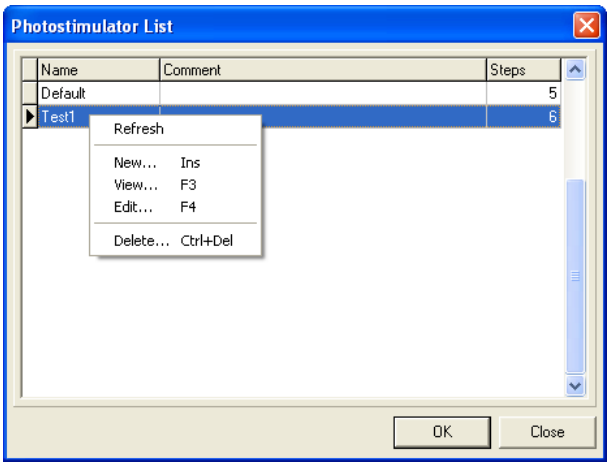


Figure 9-38. Modifying a photostimulator program

With the pop-up menu:

- If you select New, you can create a protocol based on the default protocol.
- If you select View, you can only view, not edit, the selected protocol.
- If you select Edit, you can modify the selected protocol.
- If you select Delete, you can remove the selected protocol.

Once you select a protocol, it becomes the current one and is indicated at the top of the photostimulation controls in the Acquisition control panel (Figure 9-39).

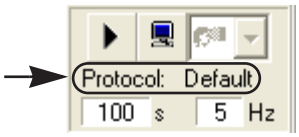


Figure 9-39. Photostimulator program indicator

Editing the Current Protocol

Choose **Options > Photostimulator > Protocols > Edit Current** to edit the current protocol. The process of editing the current protocol is similar to that of creating a new protocol (see "Creating a New Protocol" on page 209). The same fields must be defined.

Hot Keys Command

The 10th command in the Options menu is Hot Keys, which enables you to create keyboard shortcuts.

Choose **Options > Hot Keys** to open the Hot Keys window (Figure 9-40).

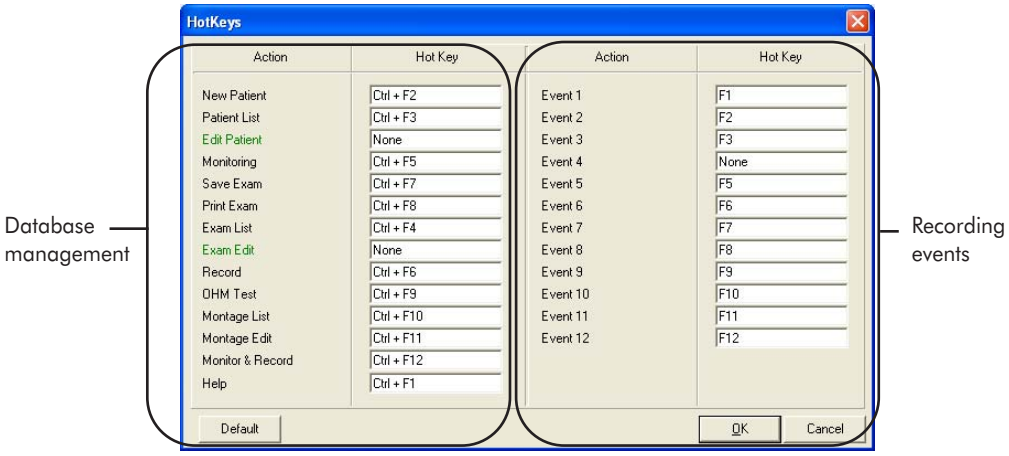


Figure 9-40. Hot Keys window

Use the Hot Keys window to create keyboard shortcuts to main Neurotravel functions. The left side of the window lists operations for database management; the right side lists operations for recording events.

To make a hot key:

1. Click in a "Hot Key" text box next to the desired "Action" name.
2. Type the button to be linked to the function.
3. Click OK to accept.

If you click the Default button, the hot-key configuration uses only the function keys listed in the upper part of the keyboard.

Note: The hot keys for recording events work only during the recording mode, not during acquisition or review, because you cannot add events during acquisition or review.

System Users Window

The 11th command in the Options menu is System Users, which enables the System Administrator to create user profiles.

Neurotravel offers three different user access levels:

- *Administrator*: Defines other operators and associated protection standards.
- *Doctor*: Performs the EEG exam and writes the medical report.
- *Technician*: Performs the exam but cannot write a medical report and/or modify the protection standards.

These levels help prevent fraudulent access and ensure that the medical report signature is not false. Only an Administrator can access the System Users window, where you create, edit, or delete user profiles of personnel who are authorized to work with the Neurotravel database.

Caution!: *Do not delete the Administrator account. Remember to record the password in a secure place.*

Choose **Options > System Users** to open the System Users window (Figure 9-41).

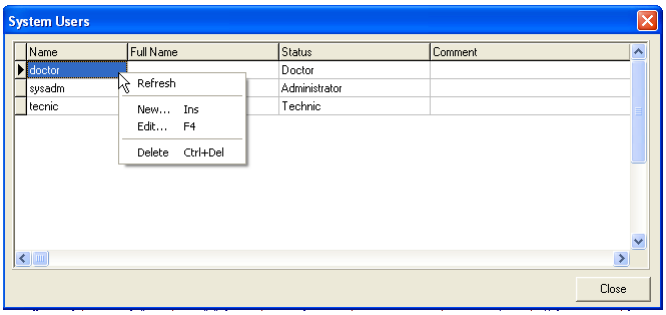


Figure 9-41. System Users window

To create, edit, or delete a user profile:

1. Right-click on the selected user profile and choose New, Edit, or Delete from the resulting pop-up menu.
2. Depending on what you choose:
   - If you select New, fill in the new-user account parameters, including name and protection standards.
   - If you select Edit, edit the user parameters, as desired.
   - If you select Delete, click Yes or No in the confirmation dialog that appears.
3. Click the Close button in the System Users window to accept the changes.

System Configuration Window

The 12th command in the Options menu is System, which enables you to specify the system configuration.

Choose **Options > System** to open the System Configuration window, for specifying data file paths, automatic dialogs to precede printing, import and export formats, and indicator-view settings. The window consists of four tabbed panes: Common, Report, Export/Import, and View.

- *Common*: Allows you to determine the data file path, archive disk, name of clinic, and printing options such as print preview (Figure 9-42).

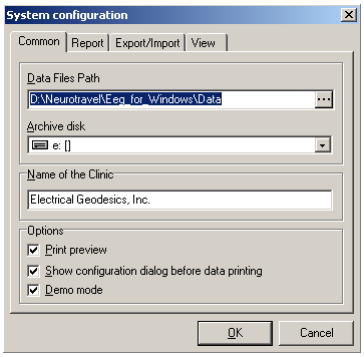


Figure 9-42. Common pane

- *Report*: Allows you to choose the external editor option template for the data (Figure 9-43).

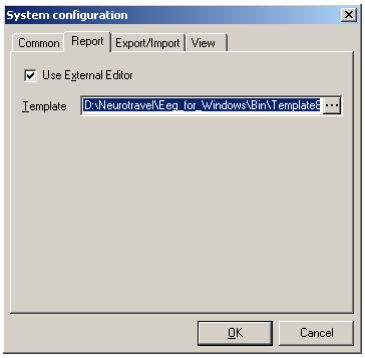


Figure 9-43. Report pane

- *Export/Import*: Allows you to specify the file paths of data exported from or imported into the database (Figure 9-44).

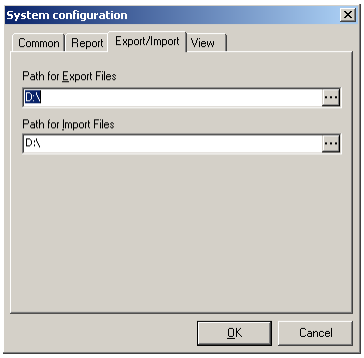


Figure 9-44. Export/Import pane

- *View*: Allows you to set whether the control panel is displayed vertically (the default) or horizontally, and whether the patient and montage status bars are displayed (Figure 9-45).

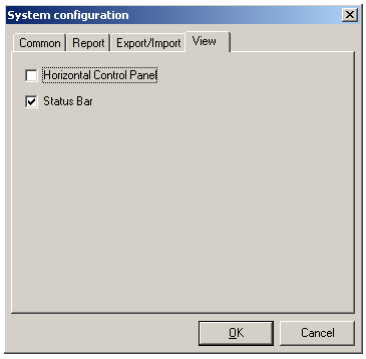


Figure 9-45. View pane

When displayed horizontally, the control panels for acquisition and review contain fewer controls than their vertical versions (Figure 9-46).

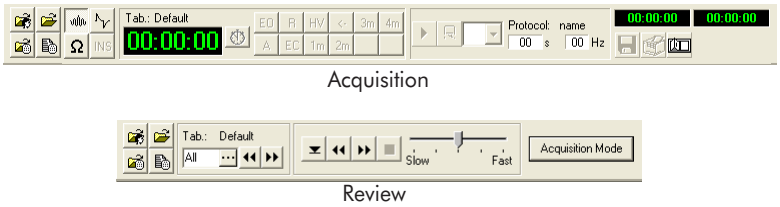


Figure 9-46. Horizontal control panels for acquisition (top) and review (bottom)

- *Acquisition*: the horizontal version lacks the montage, display setting, filter, and visualization buttons of the vertical version (see Figure 4-2 on page 73).

- *Review*: the horizontal version lacks the montage, display-settings, filter, automatic-calculation, measurement, amplitude, and VideoEEG buttons of the vertical version (see Figure 5-10 on page 99).

If the Status Bar checkbox is unselected, both the patient and the montage status bars are hidden.

System Info Window

The 13th command in the Options menu is System Info, which enables you to view system information.

Choose **Options > System Info** to open the System Info window (Figure 9-47). The window displays the following program settings:

- *Number of Patients*: number of patients in the database
- *Exams in Database*: number of exams recorded
- *Number of Archived Exams*: number of exams archived

- *Last Archive Disk Label*: label of the most recent archive disk

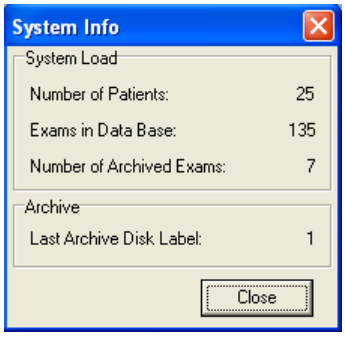


Figure 9-47. System Info window

chapter 10

VideoEEG Kit Option

The Neurotravel VideoEEG kit is an optional package designed to capture moving images of the patient during EEG acquisition. The images are coregistered with the EEG. The digital kit can be installed in any Neurotravel Win–based system that requires synchronization between EEG traces and patient images.

In addition, VideoEEG provides synchronized video and audio recording, so that the physician can add information and comments to the appropriate spots in the recording. The result is an ability to link trace events to physical movements performed by the patient during acquisition. This feature is especially useful for clinical behavioral studies in areas such as sleep.

Kit Components

The VideoEEG kit consists of:

- A video acquisition PCI card to compress, register, and review the image files from the video camera
- XPress drivers and applications for the digital acquisition board
- Additional software within Neurotravel for synchronizing the video images and the traces acquired through an ATES amplifier
- Video camera (black and white, infrared, or color)
- Microphone
- Supplementary support within Neurotravel for recording and archiving the digital videos

See Figure 10-1 for an example of a simple configuration, with the camera connected. The data-acquisition computer, or DAC, is a Dell Dimension 8400 PC.

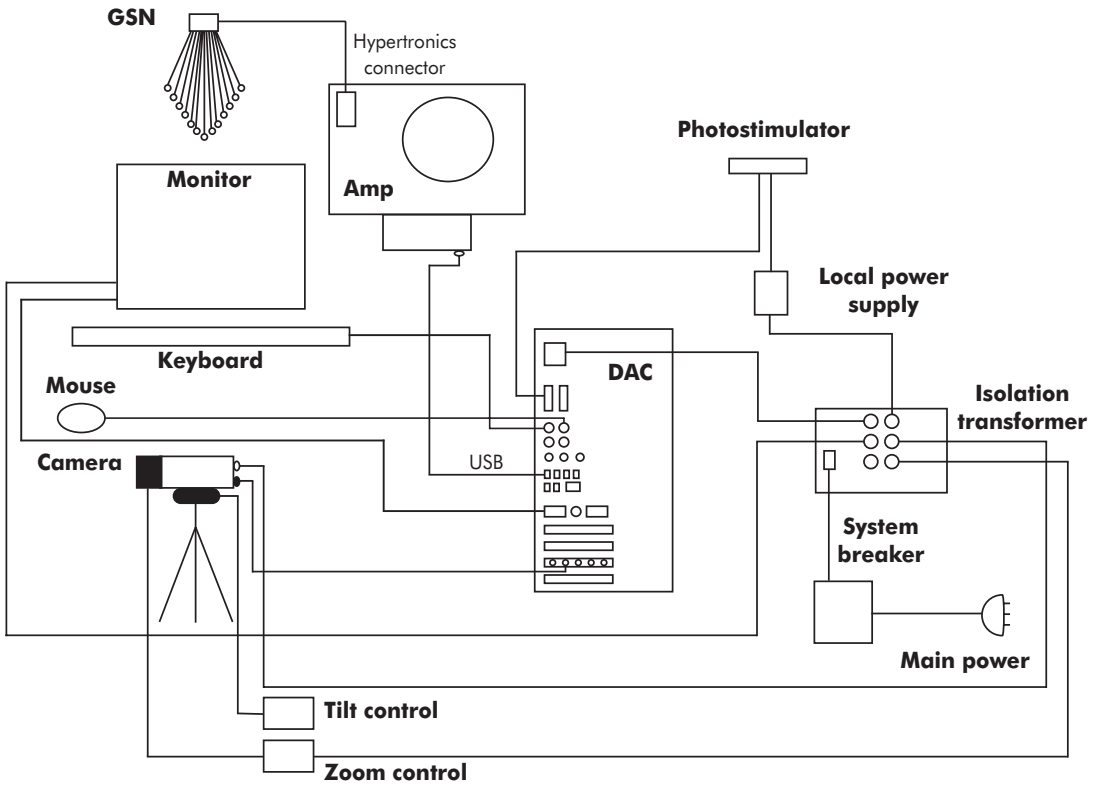


Figure 10-1. Cabling for a VideoEEG system

VideoEEG Settings

This section discusses settings designed to facilitate the recording and archiving of the digital images. The information provided is intended to help you optimize VideoEEG for your application or environment.

Note: When an exam is recorded with the VideoEEG option, it is marked with an asterisk (*) in the Patient Number field when you choose either ***EEG > List*** *or* ***EEG > Archive List****.*

System Configuration

For best results, always archive the recorded files, because video data can quickly consume available disk space. The data-acquisition computer from EGI contains a DVD-RAM drive, which is the recommended storage medium.

The video data are linked to and stored with their corresponding EEG traces. When you archive a videoEEG file, the video is archived with its EEG trace.

To check or modify these parameters:

1. Choose **Options > System**.
2. In the System Configuration window, click the Common tab.
3. Verify that the Exam Disk file path corresponds to a hard disk with sufficient capacity.

Recording Quality

The size of the video and audio files depends on the recording quality. The video screen window contains all the parameters that influence quality and, consequently, file size.

Note: You can use a smaller frame rate to reduce the drive space.

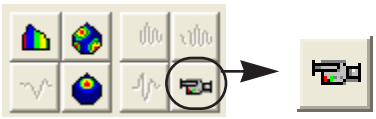


Figure 10-2. VideoEEG button

Click on the VideoEEG button (Figure 10-2) in the Acquisition control panel to open the video screen window. Figure 10-3 shows the screen controls, some of which contain pop-up menus (opened by clicking the "downward-arrow" buttons); none of the controls accept user-defined values.

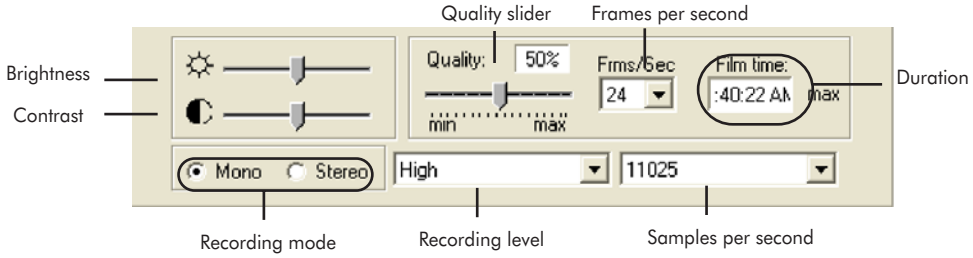


Figure 10-3. Video screen control window

Following are brief descriptions of the main controls:

- *Brightness and contrast sliders*: enable you to regulate image contrast and brightness (or you can use the video camera controls, if supplied). Adjustments to brightness and contrast are useful in dark or ambulatory environments.
- *Recording mode*: allows you to indicate whether the auditory recording will be in mono or stereo.
- *Quality sliders*: enables you to specify the quality of the acquired image (50% is generally sufficient).
- *Quality level*: provides a choice between high or low quality.
- *Frames per second*: allows you to specify the resolution of the video (24 is generally sufficient).
- *Samples per second*: enables you to indicate the EEG sampling rate.
- *Film time*: calculates the maximum available time for recording or duration, based on quality, resolution, and available hard-drive space.

The values displayed in Figure 10-4 provide a good compromise between image quality and file size. Low-quality images occupy less space on the acquisition disk than high-quality images, but they may prove less useful from a clinical point of view.

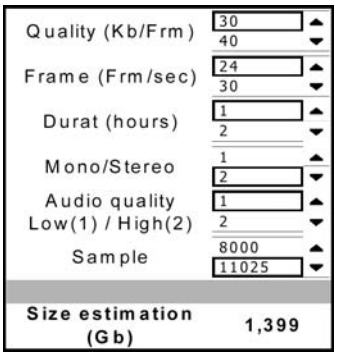


Figure 10-4. Recording quality parameters

The video screen window remains open during acquisition and recording, but cannot be moved after acquisition begins. Therefore, before acquiring data, position the window so that it offers a good view of the EEG data.

Acquiring Patient Images

Figure 10-5 shows Neurotravel operating in VideoEEG mode.

Figure 10-5. The video screen window overlaying the EEG trace

Caution!: *Do not unplug any of the video system cables while Neurotravel is acquiring data. Doing so will cause the system to stop.*

To synchronize video with EEG, the sequence of operations is video, acquisition, and record:

1. If necessary, open the Acquisition window.
2. Choose **Patient > List** and select the correct patient's name; if he or she is a new patient, choose **Patient > New** and create a patient record.
3. When the correct name is displayed in the patient status bar, click the VideoEEG button in the Acquisition control panel to open the video screen window.
4. In the video screen window, adjust the video parameters (for example, contrast, brightness) and ensure that the patient is visible in the frame.
5. Drag the video screen window to a corner of the Acquisition window.
6. Click the Acquisition toggle in the Acquisition control panel to acquire EEG signals.
7. Click the Record toggle in the Acquisition control panel, to record simultaneously the EEG signals and the video data.
8. Click the Save button when the recording is finished, to save to disk both the EEG and its synchronized video.

Caution!: *You must initiate acquisition **with** VideoEEG to synchronize video with EEG. You cannot add the video-synchronization function after clicking the Record toggle.*

Navigating through the Data

If you open a VideoEEG file on a computer *not* running the VideoEEG option, only the EEG trace is viewable.

To navigate through a VideoEEG file:

1. Open a VideoEEG exam to display an EEG exam, overlaid with the video screen window containing the patient image and the screen controls.

2. Notice the yellow line in the middle of the EEG trace area; this is called the *synch line,* and it marks the synchronization of the video images and the EEG data.

3. Navigate through the exam, using various tools:

   - Drag the synch line.
   - Use the navigation bar (see "Navigation Controls" on page 100 for more information); however, this does *not* permit audio playing.
   - Drag the scroll buttons (see "Scroll Bars" on page 68 for more information); this *does* permit audio playing.
   - Click the navigation buttons in the video review window, to go *directly* to events.

   In all cases, the video and EEG are linked timestamp, not by samples or frames.

Working with the Data

VideoEEG files are usually large because of the length of some exams (4–5 hours, or even 8 hours for sleep studies) and the computer-intensive requirements of video. To optimize space, you can delete unneeded video image sequences and related selections of a trace. For more information, see "Deleting Data Sections" on page 116.

When you select a data interval in the trace area and delete it, the corresponding video images are also deleted.

When you finally archive the exam, the video and EEG are saved to the same disk. Later, when you access the exam, the patient images with the EEG data are displayed.

chapter 11

Data and Disk Management

This chapter discusses issues that will help you enhance the performance and efficiency of Neurotravel Win. Topics include data recorded to the acquisition disk, data storage on the archive disk, disk space management, Neurotravel database organization, and Neurotravel database management.

Acquisition Disk

Neurotravel Win temporarily stores exams on the hard disk (also called the *acquisition disk*). It is important to keep the hard disk in good condition, removing unusable data that can create clutter and consume much space. The hard disk in EGI Systems is, by default, the C drive.

Although standard clinical recordings last 10–20 minutes, consuming about 15–30 MB (given Neurotravel's default sampling rate of 250 per second), some recordings may take hours, such as those for sleep studies.

In general, you may want to calculate the amount of memory required by the exams, which depends on variables such as number of electrodes. You can minimize the space taken up by some exams, by saving only essential data (with sleep studies, for example, you can select, save, and archive only the REM sections).

As an example, assume you are recording 32 channels. Because you know that the sample resolution of each electrode is 16 bits (that is, sample byte = 16 bits = 2 bytes), you can calculate the room taken for each minute of recording:

byte/minute = sample rate x number of electrodes x sample byte (2) x 60

Collecting data with 32 channels results in:

- *bytes per minutes at 250 Hz*: 960,000 (that is, 250 x 32 x 2 x 60)

Archive Disk

The following discussion will help you determine which disk size to use.

Assume that the sampling rate is 250 Hz, and the number of electrodes is 32 (same values as in the previous section). Calculate the memory required for one minute of data, using the formula described in "Acquisition Disk" on page 227.

The results are:

- A 4.7 GB disk (DVD-RAM), which in reality holds 4.2 GB of data, can hold 72 hours and 55 minutes of data (that is, 4,200,000,000/960,000 = 4,375 minutes).

Disk Space Management

Good acquisition-disk management calls for regularly transferring usable exams to archive disks, deleting unusable exams, and deleting unusable patient records. (For more information about these processes, see "Example EEG Viewing/Archiving" on page 240, "Exam Deletion" on page 158, and "Deleting Patient Records" on page 176.)

In addition, you can choose **Options > Acquisition** and obtain data based only on a specific montage.

Database Organization

Neurotravel organizes and manages all your data in a database located in **D:\Neurotravel\Eeg_for_Windows\DATA**. The database can handle large volumes of data, order them according to specified methods, quickly perform user-defined searches, automatically link database fields, and export data for use in other programs. Using either the mouse or the keyboard, you can choose menu items that enable you to manage the data by inputting, modifying, or deleting information from the database archives.

Neurotravel categorizes files into different database archives to obtain data easily, avoid duplication of files, and optimize disk space. The database archives reside on the hard drive and include:

- Patient
- Exams
- Montages
- Event tables
- Photostimulator protocols
- Frequency bands (for brain mapping)

All of these are separate files. The software maintains the links among the different archives, automatically updating related archives when you make changes in one archive. This ensures that information is correctly linked in the patient database.

For example, when EEG is recorded, Neurotravel stores the information in the exam archive, which is directly related to the patient archive. So, when you pull up a patient record and look at the exam list, the latest exam is automatically included.

Database Management Tools

This section discusses two management tools for the Neurotravel EEG database: DBSave and DB_Util. DBSave makes a copy of your DATA archive, and DB_Util rebuilds your database index. Both data-management tools are downloaded during the Neurotravel installation process and reside in **D:\Neurotravel\Eeg_for_Windows\Utility**.

These tools should be used only by qualified personnel. Please read the following information carefully before performing any of the operations.

Creating a Copy of the DATA Archive

Every two weeks, you should use DBSave to make a copy of the DATA archive, which contains your databases. The copy will allow you to retrieve previous versions of your files, if necessary.

Choose **Start > My Computer > D:\ > Neurotravel > Eeg_for_Windows > Utility** to locate DBSave (Figure 11-1).

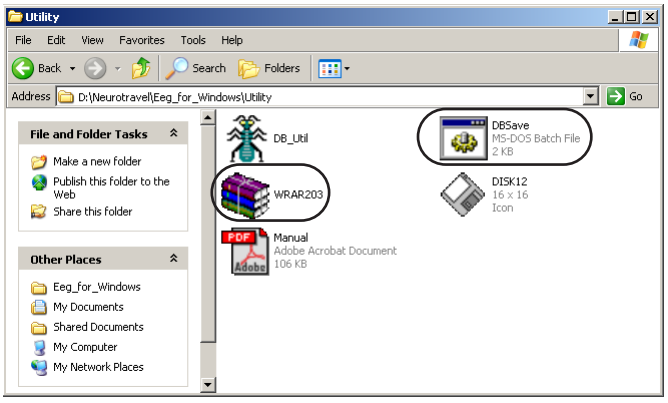


Figure 11-1. Utility folder

Using DBSave

Following are steps to using DBSave to save your database:

1 Double-click on the WRAR203 icon in the Utility folder (see Figure 11-1).

2 Accept the default installation settings (Figure 11-2).

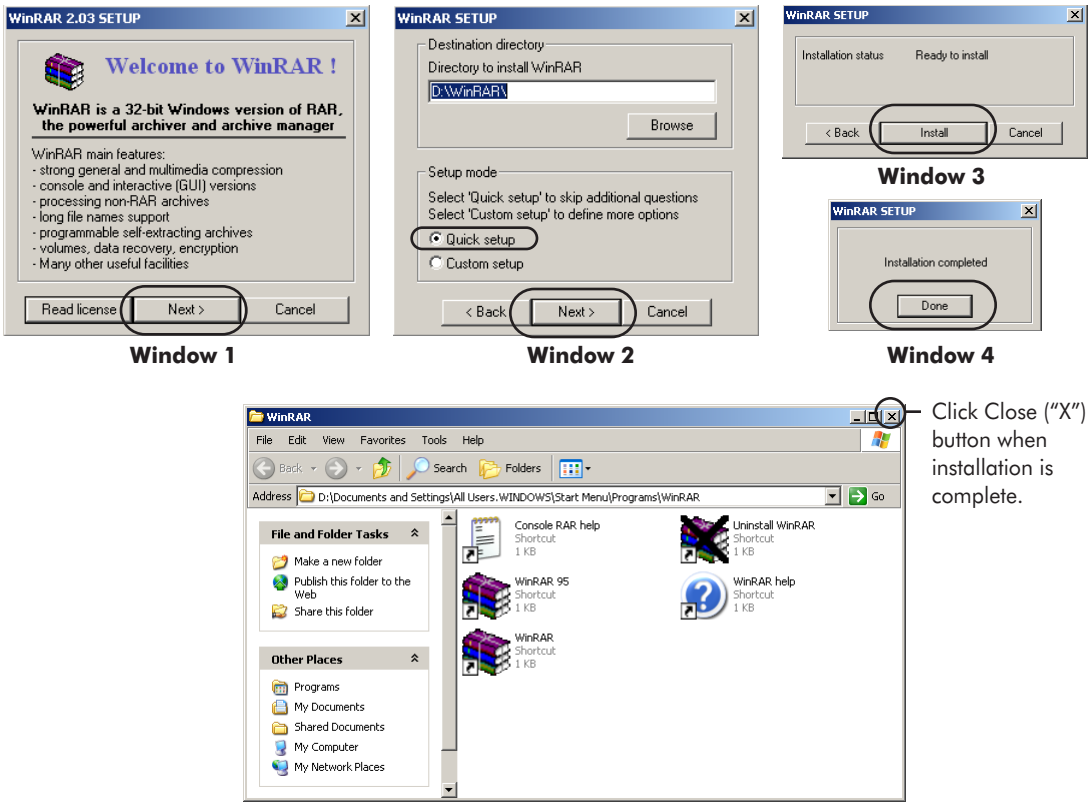


Figure 11-2. Installing WRAR203 (default settings circled)

3 In the Utility folder (see Figure 11-1), double-click on the DBSave icon, which opens the DBSave window (Figure 11-3).

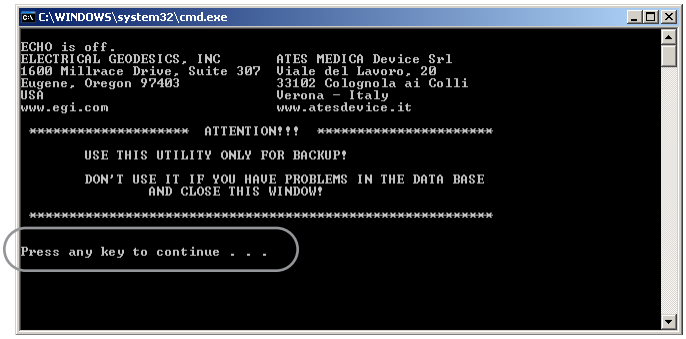


Figure 11-3. DBSave window

4 As instructed in the window, press any key on the keyboard, to initiate the saving process (Figure 11-4); when finished, the window automatically closes.

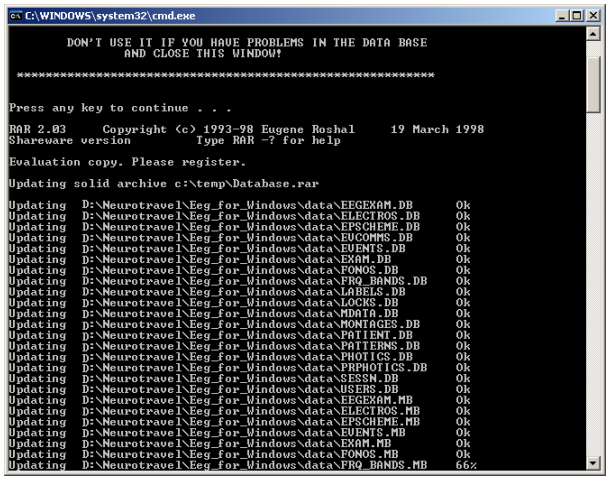


Figure 11-4. DBSave saving files

5 If you wish to change the data path of the saved files, right-click on the DBSave icon in the Utility folder, choose Edit from the resulting pop-up menu (Figure 11-5; left) to open the DBSave Notepad file, edit the file path for the **d:\winrar\rar** line (Figure 11-5; right), and run the DBSave utility again (repeat Steps 3–4).

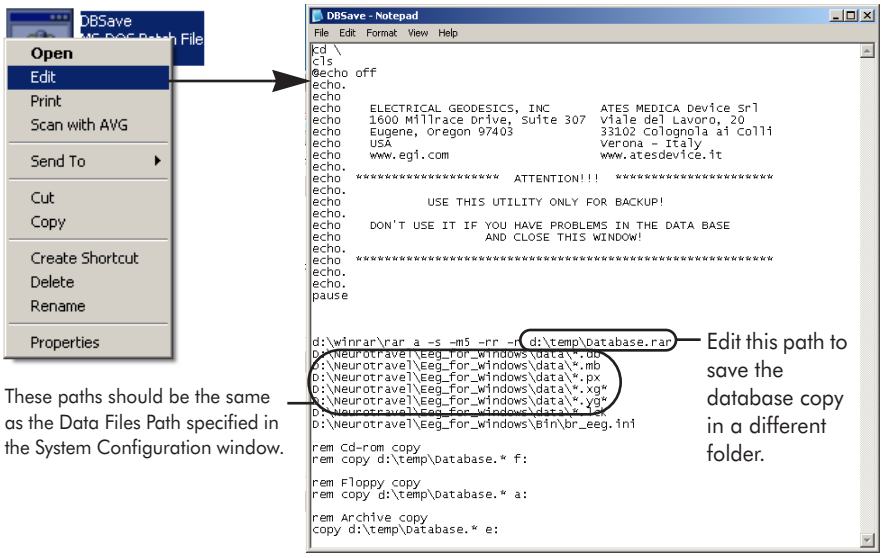


Figure 11-5. Editing the DBSave destination path

*Note: If your data archive paths in the DBSave Notepad file (Figure 11-5; right) are different from the default Data Files Path specified in Neurotravel's System Configuration window (choose **Options > System > Common** to check), then change the paths in the Notepad file.*

Checking Database Values

The DB_Util application also resides in the Utility folder of the Neurotravel Win application (Figure 11-6).

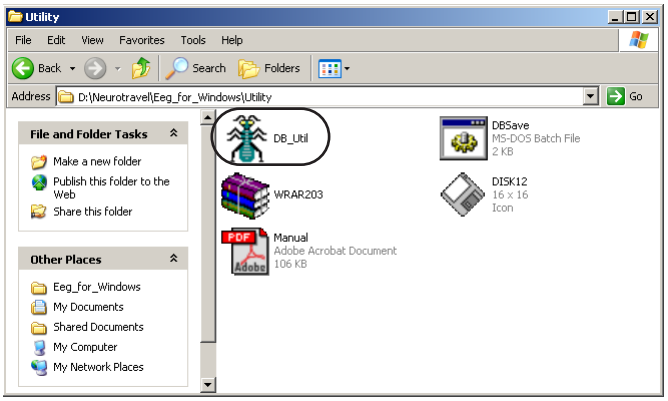


Figure 11-6. Utility folder

DB_Util is designed to check and eventually repair (whenever possible) Neurotravel database values.

Using DB_Util

Following are steps to using DB_Util to repair your database:

1 Double-click on the DB_Util icon in the Utility folder (see Figure 11-6) to open the DB_Util window; DB_EEG is the default Target BDE alias (Figure 11-7).

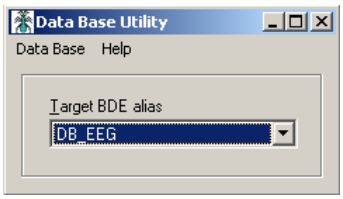


Figure 11-7. DB_Util window

2 In the DB_Util window, use the Database menu to check or repair values (Figure 11-8):

- *Check Consistency*: checks the values
- *Rebuild Indices*: repairs the values

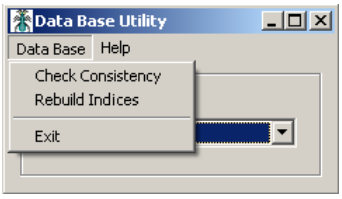


Figure 11-8. DB_Util Database menu

appendix A

SOFTWARE TECHNICAL SUPPORT

Before Contacting EGI

Please check the Contents on page v or the Index on 243 for coverage of your issue or question. You can also perform an electronic search using Find or Search in the PDF version of this manual posted on the Documents page of the EGI website (www.egi.com/documentation.html).

In addition, the Support page of the EGI website (www.egi.com/support.html) may have the information you need.

If you need more help, EGI recommends the following:

• ***Try to isolate the problem***. Is your problem well defined and repeatable?

• ***Document the problem.*** Carefully record and organize the details gleaned from the above step and report the problem to EGI.

Contacting EGI

EGI Support web page	www.egi.com/support.html
Email support	support@egi.com
Sales information	info@egi.com
Telephone	+541-687-7962
Fax	+541-687-7963
Address	Electrical Geodesics, Inc. 1600 Millrace Drive Suite 307 Eugene, OR 97403 USA

APPLICATION EXAMPLES

Neurotravel Win Recording

To make an EEG recording, apply the 32 sensors to the patient's head, following the instructions in the *Geodesic Sensor Net Technical Manual*.

Example EEG Acquisition/Recording

Once you have properly applied the sensors, you can begin preparations for acquiring and recording EEG data:

1. Check that the event table contains the correct events for the session. If you have no modifications from the last session, Neurotravel will automatically call up the last table used.

2. If you anticipate requiring a different events table, choose **Options > Events > List** and select the correct table. You may need to create a new event table by choosing the New item.

3. Check that the automatic photostimulation program is correct. If you have no modifications from the last session, Neurotravel will automatically call up the last program used.

4. If you anticipate requiring an automatic photostimulation program, choose **Options > Photostimulator > List** and select the correct program. You may need to create a new program by choosing the New item.

5 In the exam window, provide the following information:

- Patient
- Channel setup
- Event table (optional)
- Automatic photostimulation program (optional)

6 Check that the montage and acquired electrodes are correct.

7 Click the Acquisition toggle in the control panel to initiate data acquisition.

8 Click the calibration button to display the calibration signal or click the EEG button to display the actual acquisition traces.

9 Click the Record toggle to initiate recording of the exam.

10 After the session ends, you can decide whether to store the exam to the acquisition disk. If you do choose to store it, click the Save button.

11 Once the exam is saved to the acquisition disk, you can review and edit it, and later prepare it for archiving.

For more information, see Chapter 4, "Acquisition and Recording."

Example EEG Viewing/Archiving

You can review acquired exams at any time. If they are not archived to an optical disk, you can input or modify the data as well. If they are archived, you can display the data but not modify them.

Viewing Modes

The EEG menu offers three modes to review the data: current patient review, hard-disk review, and archive review. In each mode, you can view a trace and its characteristics, scroll through the file, search for events, zoom in on details, and so on. Following are brief descriptions of each mode:

- ***Current patient review***: Enables you to review selected current patient traces. To access this mode:

- Select a patient (see “Selecting a Patient Record” on page 169).
- Choose **EEG > Current Patient List**. A list of the current patient’s exams appears, with information such as the acquisition date of each trace, its session length, and the optical disk label (if archived).
- In this mode, you can transfer exams from the acquisition disk to the archive disk.

- ***Hard-disk review***: Enables you to review recorded traces on the central archiving unit’s hard disk. To access this mode:
  - Choose **EEG > List**. A list of exams appears, ordered by acquisition disk.
  - The exams are temporarily stored on the hard disk and can be archived or deleted, as necessary.
- ***Archive review***: Enables you to review traces already archived on disk. To access this mode:
  - Load the storage media (for example, optical disk) that contains the archived EEG traces.
  - Choose **EEG > Archive List** and check that the correct disk (E drive) is selected.

For more information, see Chapter 5, "Review and Processing.”

Archiving Data

Note: Save your database before copying the data to the archive disk. Use the DBSave file in the Utility folder of the Neurotravel application folder (see “Creating a Copy of the DATA Archive” on page 230).

Briefly, to archive data:

1. Make sure that the appropriate storage media (for example, a DVD-RAM disk) is loaded.
2. Choose **EEG > Current Patient List** to select and open an exam to archive.
3. Right-click and choose Edit Exam Info from the resulting pop-up menu, to review the notes about the exam.

4 If the exam has been reviewed by the appropriate parties and is ready for archiving, right-click and choose Archive from the resulting pop-up menu (or press Control-A on the keyboard), to begin transferring the exam from the acquisition disk to the archive disk.

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